

**An Analysis of the Role of Extension Methodology on  
Poverty Reduction: A Comparative Study of Aquaculture  
Extension Programmes in the Northwest Fisheries Extension  
Project (NFEP) Command Area, Bangladesh.**

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## ABSTRACT

The current deficiencies of extension interventions in aquaculture in Bangladesh, in particular, in the North-west have been examined. The importance of the inclusion of a social dimension in development interventions has been reviewed. Aquaculture, extension, social development and poverty are defined in the context of the study and a model of their interactions is proposed and used to elucidate the role of aquaculture in poverty reduction. Research questions were generated to examine the contention that *‘Aquaculture Extension Approaches that fail to substantially address social development will lead to no more than a superficial reduction of poverty’*. The study approach chosen was comparative case study (the first use of its' kind in this context). Within the study, communities representing four different aquaculture extension approaches and a, null-case, control were selected and then engaged in the research process. The findings that emerged from the study were matched and linked to the proposed model to establish patterns and linkages between aquaculture and poverty; extension and aquaculture; aquaculture and social development; social development and poverty; extension and poverty. The study suggests that all these aspects go hand in hand within communities, and that it is the degree of marginalisation that defines the success of any intervention as much as the intervention approach itself. The study indicates that aquaculture could be an entry point for a poverty alleviation strategy but the inclusion of a social dimension, together with the chosen technical intervention, is essential in achieving higher impacts on a sustainable basis. A number of recommendations for greater poverty impact through aquaculture intervention as an entry point are put forward, including the targeting of women as well as men, emphasise a learning approach, and the building of networks through forming community producers groups, fish clubs, Fry Traders and fingerling producers groups.

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## ACRONYMS AND ABBREVIATIONS USED

AFO	Assistant Fisheries Officer
BBS	Bangladesh Bureau of statistics
BFDC	Bangladesh Fisheries Development Corporation
BFRI	Bangladesh Fisheries Research Institute
BRAC	Bangladesh Rural Advancement Committee
CIDT	Centre for International Development and Training
DANIDA	Danish International Development Agency
Dec	Decimal ( $=44m^2$ , $=1/100$ of an acre)
DAE	Department of Agriculture Extension
DFID	Department for International Development
DFO	District Fisheries Officer
DoF	Department of Fisheries
EO	Extension Officer
FA	Field Assistants
FT	Fry traders
FAO	Food and Agriculture Organisations of the United Nations
GDP	Gross domestic product
GoB	Government of Bangladesh
Hec	Hectares
ICLARM	International Centre for Living Aquatic Resources Management
IFAD	International Fund for Agricultural Development
IFADEP	Integrated Food assisted development project
kg	Kilogramme (1000 gm)
km	Kilometre
MFVP	Model Fisheries Village Programme
MAVP	Model Aquaculture village programme
MoFL	Ministry of Fisheries and Livestock, Government of Bangladesh
NAEP	National Agricultural Extension Policy
NFEP	North west Fisheries Extension Project
NACA	Network for Aquaculture centres in Asia
NGO	Non Governmental Organisations
ODI	Overseas development institute
OECD	Organisation for economic co-operation and development
PAPSL	Poverty Assessment as Sustainable Livelihoods
PPA	Participatory Poverty Assessment
PRA	Participatory Rural Appraisal
RDRS	Rangpur Dinajpur Rural Service
SL	Sustainable Livelihoods
SLA	Sustainable Livelihoods Approach
SRL	Sustainable Rural Livelihoods
TCO	Technical Co-operation Officer
TFO	Thana Fisheries Officer
TLFEP	Thana Level Fisheries Extension Project
UNDP	United Nations Development Programme
UFO	Upazilla Fisheries Officer
WR	Wealth Rank
WRG	Wealth Ranking Groups

## GLOSSARY OF TERMS

Amon	Rice sown in the monsoon season
Beel	A depression which mostly retains water year all the round
Boro	Rice sown in the dry season and harvested before the monsoon
Cage culture	Fish rearing in cage suspended in the water
Decimal	100 decimals is equal to 1 acre or 44m <sup>2</sup>
Hapa	A kind of holding net usually used to keep fish fry
Homestead land	Yard or compound of household
Household	A family unit stay together and use common resources for living
Khas	Government owned land or water bodies
Matbar	Village headman
Pacca	Brick and concrete structure
Para	A neighbourhood, cluster of households
Salish	Village court
Thana/Upazilla	A geo administrative unit under a district comprises several unions
Union	A lowest local government structure
Village	A community comprised of one or several para/cluster of households
Puja	Hindu religious festival

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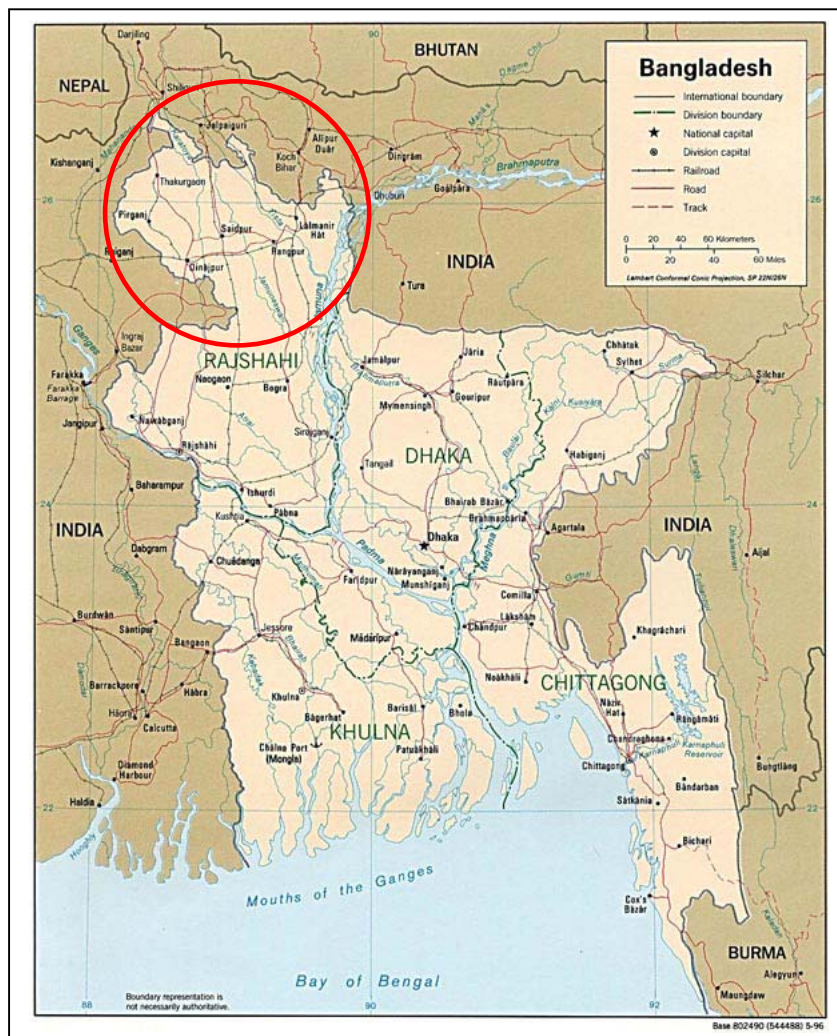
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## CHAPTER 1: INTRODUCTION

### 1.1 Bangladesh

The People's Republic of Bangladesh is the largest delta in the world, having an area of about 148,393-sq. km and is flat as far as the eye can see (Monan, 1995; BBS, 1992). The country is situated within the Ganges delta at the South-Eastern side fringed by the Bay of Bengal to the South and Myanmar to the Southeast. The other parts are bounded by India (see map 1).



Map 1. Bangladesh, with the Command Area of NFEP circled in red.

The present population is 130 million. 79.1% of which live in rural areas and 20.9% live in urban areas (FAO, 1999). Some 73% of the total land area is used for arable cropping, 2%

permanent crops, 5% permanent pastures, 15% woodlands and 5% others (FAO 1999). Rice is the major crop and is grown in about 80% of total cultivable lands. Other principal crops include wheat, sugarcane, tobacco, oilseeds, pulses and potatoes (ESCAP, 1995). Her economy is based upon agriculture, which employs 63% of the labour force, contributes 32% of the GDP and supports 24% of exports (ADE-ODI, 2000). The average rainfall is 2000 mm (ADE-ODI, 2000). The natural resources include natural gas, arable land and timber. The country enjoys a mixed ethnicity of which 88.3% are Muslims, 10.5% are Hindu and 1.2% others. The current literacy rate is 38.1% (FAO, 1999). Bangladesh is the world's most densely populated non-industrial country. The Human Development Index (HDI) value for Bangladesh was 0.470 in 1999 and it was ranked 132 in the world. The population below the poverty line (\$1 a day) was reported as 29.1%. The GDP per capita annual growth rate in 1999 was reported as 3.1% (UNDP, 2000).

ADE-ODI (2000) reported that recent social and economic performance showed positive trends in some respects. It further noted that although more than half of the rural population still lives below the poverty line, and this figure has been showing a decline. Bangladesh has also made noteworthy progress in education, children by choice and child immunisation (ADE-ODI, 2000). There has been a remarkable growth in the NGO sector in recent years and this has had positive impacts on rural livelihoods (ADE-ODI, 2000).

### **Role of Fish and Fisheries in Bangladesh**

Bangladesh is also popularly known as the country of rivers because of the large number of rivers flowing across the country. There is a common and very popular proverb in Bangladesh that '*rice and fish makes a Bengali*'. Traditionally, fish plays a significant role in the economic and socio-cultural life of Bangladeshi people. She has been blessed with vast inland water and marine resources as set out below in Table 1.1 (Ahmed and Chowdhury, 1999). Bangladesh has a very productive fisheries resource (World Bank, 1991). It has ideal physical conditions for fish production too (Lewis, 1997). UNDP (2000)

reported that Bangladesh is considered one of the most suitable countries in the world for aquaculture, due to its favourable agro-climatic conditions. World Bank (Lewis, 1997, p.1) mentioned that *'fish supply approximately 80 percent of the animal protein and 7 percent of the total protein intake in the average Bangladeshi diet'*.

In inland water, there are 260 indigenous fish, 12 exotic fish and 24 freshwater prawn species available. In marine water, there are 475 fish and 36 shrimp species found. In addition, the marine resource includes turtle, crabs, oysters and seaweed (MoFL, 1998).

In 1996-97 the total production of fish was 1.31 million tonnes. Capture fisheries is still the highest source, contributing about 46%, the closed water bodies account for about 33% and the marine catch provides 21% of the total harvest (Ahmed and Chowdhury, 1999). The projected fish production in 1998-99 was 1.62 million tonnes.

In 1997-98 fisheries constituted about 5.93 % of the country's total export earnings and therefore contributed to about 5% of the country's national income. Lewis (1997, p.533) mentioned that *'expectations about unfulfilled potential of aquaculture as a source of protein for the poor of Bangladesh are currently running high'*. The per capita fish supply was estimated to be 9.5 kg pa. (FAO, 1999). Shrimp is the major export and earns a substantial sum of foreign exchange.

Aquaculture in Bangladesh has been contributing substantially not only in employment generation and export earnings but also in supplying animal protein for a vast majority of people (Mazid *et al.*, 1995). A total of about 10.2 million people's livelihoods are dependent upon aquaculture (DoF, 1999). Bangladesh, in recent years, has made considerable improvement in fish culture technology, in particular in pond-based systems (ICLARM, 1998).

**Table 1.1: Inland & Marine water resources**

<b>A. INLAND WATER RESOURCES</b>	
<b>Resources INLAND</b>	<b>Water Area (in hectare)</b>
i. Inland (Open water)	
❑ River and brackish water	1031536
❑ Beel	114161
❑ Kaptai Lake	68800
❑ Flood plain	2832792
<b>Total</b>	<b>4047316</b>
ii. Inland (Closed Water)	
❑ Ponds	146890
❑ Baor (Oxbow Lakes)	5488
❑ Coastal Shrimp Farm	137996
<b>Total</b>	<b>290374</b>
<b>Grand Total (i+ii)</b>	<b>4337690</b>
<b>B. MARINE WATER RESOURCES</b>	
<b>Resources</b>	<b>Kilometres/Sq. Kilometre</b>
❑ Coast Line	480 Km
❑ Internal Water	25151 sq. Km
❑ Territorial Water	9065 sq. Km
❑ Economic Exclusive Zone	140915 sq. Km
❑ Continental Shelf	85153 sq. Km
<b>Total</b>	<b>166066 sq. Km</b>
Source: Department of Fisheries, Bangladesh, 1999	

DFID (1999 p.1) stated that ‘*Bangladesh has a vibrant fish culture sector with a wealth of technical expertise that has developed a country wide network of hatcheries, nurseries, fry traders, grow out farmers, fish retailers and processors*’.

There has been, however, a decline in fish production in inland capture fisheries in open waters but on the other hand, production in closed water bodies has risen (Bhuiyan, 1999). Closed water body aquaculture has huge potential in Bangladesh but only 60% of such water bodies are being cultured and 40% are under-utilised (FAO, 1999). Lewis (1997, p.533) cited that ‘*Bangladesh has, theoretically at least, vast areas of water bodies which could produce more animal protein at little apparent extra cost*’.

The Government of Bangladesh has realised the potential of this sector and outlined a comprehensive “National Fisheries Development Policy” in 1998 to foster fisheries development. The principal objectives of the “National Fisheries Policy” (MoFL, 1998) are:

- ❑ Development of fisheries resources and increase production
- ❑ Create self employment opportunities to alleviate poverty and improvement of socio-economic conditions of fishers communities
- ❑ Supply and fulfil animal protein demand
- ❑ Acquire higher economic growth rate through exporting fish and fishery products
- ❑ Environmental balance, conservation of bio-diversity and improve public health

To increase the efficiency of this sector a co-ordinated effort will be made the principle scope of the ‘National Fisheries Policy’ MoFL (1998), based upon the following areas:

- ❑ Policy on conservation, management and harvesting of inland open water resources;
- ❑ Policy on inland closed water aquaculture and management;
- ❑ Policy on coastal shrimp and fish farming;
- ❑ Policy of conservation, management and harvesting of marine water resources;
- ❑ Policy to assist fisheries related activities
  - (a) Establishment of improved hygienic fish landing centres
  - (b) Fish transportation and marketing
  - (c) Fish processing and quality control
  - (d) Fish export
  - (e) Fisheries related education policy
  - (f) Fisheries training policy
  - (g) Fisheries extension policy
  - (h) Fisheries research policy
  - (i) Strengthening of organisational capacity



- (j) Fisheries and environment policy
- (k) Fisheries credit policy
- (l) Fisheries co-operative policy
- ❑ Fisheries related other areas

The Government of Bangladesh has set a target of producing 2.75 million tonnes of fish by the end of fiscal year 2001-2002 (Ali, 1998). The followings are the key areas Government of Bangladesh initiatives mentioned in the 2<sup>nd</sup> Fifth year plan (1997-2001) to mitigate fish demand and in achieving projected production in the country which are pointed out as follows (Ali, 1998):

- ❑ Increase fish production and eventually to improve nutrition
- ❑ Employment generation in fisheries and fishing industries
- ❑ Improve socio-economic condition of fishers, fish farmer and related stakeholders
- ❑ Increase income by increasing shrimp, fish and fishery product export
- ❑ Improve aquatic environment for health
- ❑ Biological management of aquatic resources and improvement of organisational structures
- ❑ Uplift fish harvesting, landing and marketing systems
- ❑ Upgrade quality of exportable fish and fishery products
- ❑ Strengthen fisheries research, fisheries management and extension & training activities

This comprehensive policy is dependent upon how these initiatives are operationalised both on a short term and long-term basis. More importantly implementation of these policies will require institutional changes and improvement of the capacity of both government agencies and the NGOs working in the fisheries sector (FAO, 1999). It further emphasises the importance of involving resource users in the management process. To accelerate the pace of fisheries development in the country, there are 34 development projects (1999-

2001) currently being implemented (Langworthy *et al.*, 2001). The overall targets are to increase efficiency and growth in this sector and eventually to support food security and poverty alleviation.

## **1.2 Role of Institutions involved in Aquaculture Development in Bangladesh**

To enhance growth and development of the fisheries sector the following institutions have been working in unison. Efforts have also been made to co-ordinate and strengthen collaboration wherever necessary. A brief description of their specific missions are sketched below:

### **1.2.1 The Department of Fisheries (DoF)**

To make progress the Department of Fisheries has been working since 1942 for the development of the fisheries sector. The DoF has a key role in providing extension and training to the farming community. The mandates of the Department of Fisheries (DoF) are sketched below (Ahmed and Chowdhury, 1999):

- A. Transfer of Technology
  - (a) Extension service on aquaculture management
  - (b) Training and advisory services to people on aquaculture and management
  - (c) Render advisory services to provide credit on fisheries
  - (d) Dissemination of modern technology on aquaculture, fisheries management, hatchery operation etc
- B. Conservation of Fisheries Resources
  - (a) Enhancement of fisheries through conservation and management of fisheries resources
  - (b) Enforcement of fisheries rules, regulations etc.
- C. Quality control of Fish and Fishery products
  - (a) Ensure quality of fish and fishery products and issuance of health certificate of exportable fish products

- (b) Enforcement of Fish and Fish products (Inspection and Quality control rules)

D. Others

- (a) Advising the Government in formulating policies related to fisheries
- (b) Collection of data on fisheries and it's compilation, editing and publication
- (c) Planning, Formulation, Implementation, Monitoring and Evaluation of Fisheries development projects
- (d) Socio-economic improvement of fisher-folk community
- (e) Poverty alleviation through fisheries activities

### **1.2.2 The Bangladesh Fisheries Research Institute (BFRI)**

The BFRI was created in 1984 to enhance faster development of the Fisheries sector.

The specific objectives of the BFRI are briefly sketched below (Anonymous, 1996)

- ❑ Conduct and co-ordinate basic and applied research for development and efficient utilisation of water resources
- ❑ Monitor technological suitability for increased production and better management
- ❑ Evolve import alternatives and cost effective methods for national use
- ❑ Strengthen capacity of BFRI staff members through training and also disseminate technologies developed to users
- ❑ Advise Government on fisheries management and research for fisheries development

So far, the BFRI has developed 22 technical innovations in areas such as fingerling production of carps; carp poly-culture technology in perennial waters, Tilapia and Thai silver barbs (Thai shorputi) production in seasonal water bodies; integrated rice: fish technology; integrated duck/poultry: fish culture technology; fingerling production and culture techniques of hybrid magur (cat fish); pangus culture and backyard prawn post larvae production technology (Mazid, 1999). In addition, the Faculty of Fisheries,

Bangladesh Agricultural University and a few other universities in Bangladesh also have small-scale research programmes along with producing graduates and postgraduates.

### **1.2.3 The Bangladesh Fisheries Development Corporation (BFDC)**

The Bangladesh Fisheries Development Corporation (BFDC) was established in 1964. The aims and objectives of the BFDC are as follows (Anonymous, 1996)

- ❑ Create fisheries industry
- ❑ Implement projects on fisheries exploitation and improve harvesting techniques
- ❑ Facilitate buying and selling of boats, fish carriers etc.
- ❑ Enhance and provide credit to co-operatives and to establish fish industries
- ❑ Encourage and establish co-operative societies
- ❑ Conduct survey and research for fisheries development
- ❑ Form and operate fish landing, transportation, processing centres
- ❑ Implement project and constitute institutions for fish and fisheries export

### **1.2.4 The Non-Government Organisations (NGOs) Aquaculture Programmes**

After national independence, NGOs emerged with a mission to support development and improve the distribution of relief and have been diversifying their activities and programmes to enhance social development. Lewis (1997.p. 536) cited that *'one of the obvious ingredient is the ability of NGOs to identify those needs which remain unmet by government and to move into these previously unoccupied spaces with their own programmes and activities'*

To enhance the growth and development of the aquaculture sector the Government is encouraging NGOs participation. DFID (1999 p.6) mentioned that *'there is a widespread and dynamic NGO sector in Bangladesh'*. NGOs have also identified fisheries as an income generating area and are targeting work with landless and marginal farmers, and particularly with women (Lewis, 1997). NGO involvement in aquaculture includes management of

open and closed water bodies, cage aquaculture, rice *cum* fish farming *etc.* (Lewis, 1997; Sattar, 1999; Bhuiyan, 1999). In general, NGO programmes are also supported by credits. It is therefore hoped that by being involved in growing fish the increase in income will impact upon livelihoods to eliminate poverty (Bhuiyan, 1999).

There are several NGOs such as Bangladesh Rural Advancement Committee (BRAC), Proshika, ASA, Grameen Matsya Foundation, Caritas, CODEC; Banchte Sekha *etc.* which have extended aquaculture development programmes (Amin, 1998). NGO approaches are multi-focus and generally involve group formation, making credit provision and targeting overall social development work along with transfer of technology (Lewis (1997). The major areas of NGO aquaculture sector interest are:

- ❑ Pond aquaculture
- ❑ Improvement and use of public water bodies and borrow pits for aquaculture
- ❑ Group/community management of larger fisheries
- ❑ Cage aquaculture
- ❑ Rice; fish culture
- ❑ Establishment of hatcheries for fish and prawn fingerling production

Bhuiyan (1999 p.9) opined that *‘by involving themselves in fisheries activities and organising the poor to that effect, NGOs have successfully used fisheries sector as a tool to materialise their objectives and vision’*. The NGO contribution further includes areas such as inland closed water aquaculture; construction and renovation of derelict ponds; open water management; management of beels and oxbow lakes and technology transfer (Sattar, 1999). There is potential for collaboration between the DoF and NGOs for increasing efficiency in this sector (Lewis, 1997; Bhuiyan, 1999). Sattar (1999) identified the following potential areas for GO-NGO co-operation:

- ❑ Aquaculture management in ponds/dighis
- ❑ Beels and oxbow lakes management

- ❑ Fingerling stocking and management of open water fishery
- ❑ Irrigation, flood control canal and borrow pits fisheries management
- ❑ Small water-body resources management
- ❑ Transfer of technology
- ❑ Management of jalmahals (Government owned water bodies)

DoF can facilitate opportunities for exchanging information since NGOs do not have enough access to technical research findings (Lewis, 1997) and thereby enhance growth in the aquaculture sector (Lewis, 1997; Amin, 1998). Combined efforts can have much greater influence both in terms of increasing production and also improving socio-economic conditions of people involved in this sector for their livelihoods (Sattar, 1999).

#### **1.2.5 The Private Sector**

There has been a rapid growth in the development of private hatcheries and nurseries. The private sector fisheries in Bangladesh now supply the bulk of the fish seed produced in the country. An estimated sum of 12,000 kg of spawn are produced by this sector (Bhuiyan, 1999 p.6). He further mentioned that *'private hatchery production increased by more than 250%'*. Edwards (1999 p. 14) opined that *'Bangladesh has a dynamic private sector in production, nursing and distribution of seeds'*. There has been a rapid growth of private entrepreneurs both in freshwater and prawn farming and this is contributing to exports. As Ahmed and Chowdhury (1999 p.8) recognised, *'there is a need to strengthen DoF's capability to cater the service to the private sector in aquaculture production and marketing'*.

The DoF, the BFRI, and the BFDC are working closely for the overall development of aquaculture in Bangladesh. The Non-Governmental organisations are also participating for fisheries advancement. The private sector participation has been very positive. The DoF Extension Service includes advice on aquaculture and related activities, publication and

distribution of booklets, posters, leaflets etc. Indeed, the DoF is playing a key role in providing extensive extension and training services throughout the country. DoF communicates with farming communities through direct communications, group/community based methods and mass media communication (Bhuiyan, 1999). However, the DoF lacks staff and means of mobility at the field level (World Bank, 1991). During recent years the extent of extension efforts have been gradually increasing but still further improvement is needed (Ahmed and Chowdhury, 1999).

Due to a variety of reasons production of fish could not keep pace with the growth rate of population of the country (Ahmed and Chowdhury, 1999). The following are considered to be the constraints to aquaculture development in Bangladesh (Gupta *et al.*, 1994; Lewis, 1997; FAO, 1999;) and are noted below:

- ❑ Availability of inadequate need based appropriate technology
- ❑ Extension agents lack of confidence in technologies developed by researchers
- ❑ Input intensive technology
- ❑ Low flexibility in developed technical package
- ❑ Non availability of quality seeds to the farming communities
- ❑ Non availability of fish culture inputs in rural areas
- ❑ Ignorance of social and economic aspects of aquaculture
- ❑ Poor distribution of simple technical messages in rural areas
- ❑ Insufficient financial resources
- ❑ Inadequate extension services
- ❑ Weak co-ordination between agencies and organisations

### **1.3 Donors involvements in Rural Developments of Bangladesh**

A number of donors from European countries such as Denmark, Germany, Netherlands, Sweden and the United Kingdom have been contributing to development, in particular, in improving rural livelihoods. In addition, the Asian Development Bank, the World Bank,

Japan, the United States and several other donors have been working to enhance growth and development of various sectors in Bangladesh. The major donor activities and programmes include (ADE-ODI, 2000):

- ❑ Poverty alleviation
- ❑ Rural development
- ❑ Health and population
- ❑ Education
- ❑ Natural resources development and management
- ❑ Food security
- ❑ Water resources management
- ❑ Disaster preparedness
- ❑ Humanitarian aid
- ❑ Rehabilitation
- ❑ Governance and human rights
- ❑ Human resource development
- ❑ Enhance micro-finance

The donor assisted activities; in particular, in the fisheries sector development will be explored in the following section.

#### **1.4 Donors Commitment in Aquaculture Development in Bangladesh**

The development of the fisheries sector in the recent past has mainly been run as donor assisted developmental projects under the Ministry of Fisheries and Livestock, Government of Bangladesh. The key donors involved in development in this sector were the World Bank; the Asian Development Bank; the Food and Agriculture Organisation (FAO); The Department for International Development (DFID) (formerly known as the Overseas Development Administration); DANIDA; IFAD; European Commission (EC); The Netherlands; Ford Foundation etc. (ADE-ODI, 2000).



The major emphases of donor assisted projects were:

- Infra-structural development
- Development of private and public sector waterbodies
- Development and dissemination of improved technology
- Improve extension and training facilities
- Increased provision of training for extensionists and farming communities
- Increase fish production
- To enhance logistic support for increased production
- Encourage private sector development
- Employment generation
- Poverty alleviation
- Food security

DANIDA has been working in aquaculture development in certain areas of the country through bilateral projects with the Government of Bangladesh and the NGOs. The programme includes development and expansion of semi-intensive fish culture, carp/prawn culture; establishment and upgrading of fish/prawn hatcheries and providing extension and training services to farming communities.

The EC project in the fisheries sector has been working firstly to increase fish production by developing public and private water bodies and to create employment opportunities.

ICLARM and the Ford foundation have been involved in developing pond fisheries and community based management of large water-body fisheries. The World Bank “Food Assisted Fisheries Sector Programme” has launched a food for work scheme in lean periods to create employment opportunities, form fisher groups and involve them in aquaculture to increase fish production and poverty alleviation. Contributions from all of these agencies has made a noticeable impact in areas such as increased production from aquatic resources;

development and management of water bodies; improved facilities for extension, training; development of human capital; employment generation; increased export earning and on food security.

### **DFID commitment to Bangladesh**

Following commitments in the DFID white paper (DFID 1997), the DFID Country Strategy Paper (CSP) mentioned that it would continue to contribute to wider Government policies to support poverty elimination (DFID, 1998). It is important to note that DFID also considers poverty as having multi-dimensional facets. To continue this support DFID has set out an agenda for its development strategy. The broad themes for development as stated in the Bangladesh CSP are:

- Sustainable improvements in livelihoods and basic services for the poor, extreme poor and those vulnerable to poverty
- Sustainable, broad based and pro-poor growth
- Better governance and more effective institutions
- Improved realisation of human rights
- Improvement in the position of women in the society
- Consistency in DFID and broader UK and Bangladeshi Government policies in support of the elimination of poverty in Bangladesh

(DFID, 1998)

DFID's support to Bangladesh includes both the public and private sector, which in turn includes a number of disciplines including natural resources. DFID's contribution to the development of the fisheries sector is noteworthy. With a view to impact upon rural people's livelihoods DFID has chosen aquaculture as an entry point for poverty alleviation. Table 1.2 represents recent DFID funded projects in fisheries in Bangladesh.

**Table 1.2: DFID Fisheries Commitment in Bangladesh (DFID, 1999)**

Serial Number	Present projects	Proposed projects
1	Fourth Fisheries Project	JALS
2	NFEP-2	CBFM
3	SUFER	
4	FTEP-2	
5	GMF	
6	Interfish-2	
7	GO-Inter-fish	
8	CAGES	
9	GOLDA	
10	RDRS	

It is stated in DFID's Bangladesh CSP (1998) that '*Current development programmes are inadequate to reach the extreme poor or address aspects of vulnerability. A more detailed understanding of poverty is needed if more effective programmes are to be developed.*' It further adds that '*we will build on the successes of agricultural and fisheries extension and applied research with the Government and NGOs through further projects*'. It is also emphasised that DFID will prioritise the livelihoods of the poor in enhancing access to technologies and land and water resources.

Recently there has been a shift in the DFID funded projects from a project based approach to programme oriented approach, which is holistic in nature to promote sustainable livelihoods for the rural poor. DFID's philosophy of development has the principle '*people and not ponds or technology, are the entry points of aquaculture*' (DFID, 1999 p.9).

Accordingly attempts are being made to design projects based on a livelihoods framework, a people centred development approach that DFID Bangladesh has called 'people-first sustainable livelihoods approach' to achieve greater impact on poverty on a sustainable basis.

The overall approach to extension at the current situation in Bangladesh will be elaborated in Chapter 2.

### **1.5 Role of NFEP in Aquaculture Development**

The development of aquaculture in the Northwest has been slow compared to other parts of the country. This is the poorest region of the country, 20% of pond farmers in the Northwest are functionally landless (NFEP PP, 1996). This is because of poor soils and the extremity of the climate (DOF and DFID, 2001). The region is also severely affected by flood and drought. A great proportion of the population is highly illiterate (Frankenburger *et al.*, 2000). People have very poor access to wider institutions. A vast majority of the population is involved in agriculture as grower, crop sharer and wage labourers. In a recent NFEP review Frankenburger *et al.*, (2000 p.12) report that *'access to land resources is restricted, and almost 50% of the population is functionally landless. Thus there is a string reliance of the poor in natural aquatic resources to secure livelihoods'*.

Considering the fact of a sharp decline of wild fish and upward trends of fish prices, people with small aquatic resources are drastically looking to better utilise their resources to at least grow fish for household consumption. It is indicated that although fish culture provides about 5-10% (Frankenburger *et al.*, 2000) of total income for a limited number of farmers, fish still holds substantial value for the vast majority of farmers. They further wrote that *'fish consumption in rural areas has declined by more than 20% indicating a decline in nutrition uptake of rural population'*. There is great potential to intensify aquaculture practices with other agro-based farming in that region.

There is also a positive skew of ownership of aquatic resources to wealthier farmers who own 78% of the ponds (Frankenburger *et al.*, 2000) in the Northwest region. The current extension system has also favoured the wealthier farmers in most cases. Fish is mostly cultured for household consumption and that for sale is very limited. The household consumption of fish varies from 100-300 kg/year (SOS report, 2000). The farmers are stocking a variety of fishes including exotic species with little or no attentions to the quality of seed and the stocking density of fish.

In the past, the Northwest had a wealth of natural spawn and fingerlings but the trends of production from natural waters had gone down tremendously. Increased demand for fingerlings has created interest for private sector development of nurseries and hatcheries in the region. The Northwest has a long history of trading fingerlings through local fry traders. They have a quite intensive network. Fry trading is a seasonal income earning activity, but nevertheless provides huge potential for those involved. It is also reported that these traders are seen to be diversifying their incomes through share cropping fish. There are now about 200 nurseries and 18 hatcheries in the Northwest region (SOS, Report, 2000).

In terms of division of labour and engagement in aquaculture, males have a dominant role. A large majority of women are reported to be involved mainly in feeding (Frankenburger *et al.* 2000).

The aquaculture constraints identified by Islam (1994) specifically in the Northwest context are as follows:

**General constraints**

- ❑ multi use of ponds
- ❑ multiple or disrupted ownership
- ❑ over flooding or dry out
- ❑ no provision of water exchange
- ❑ management made difficult due to derelict nature of ponds

**Technical constraints**

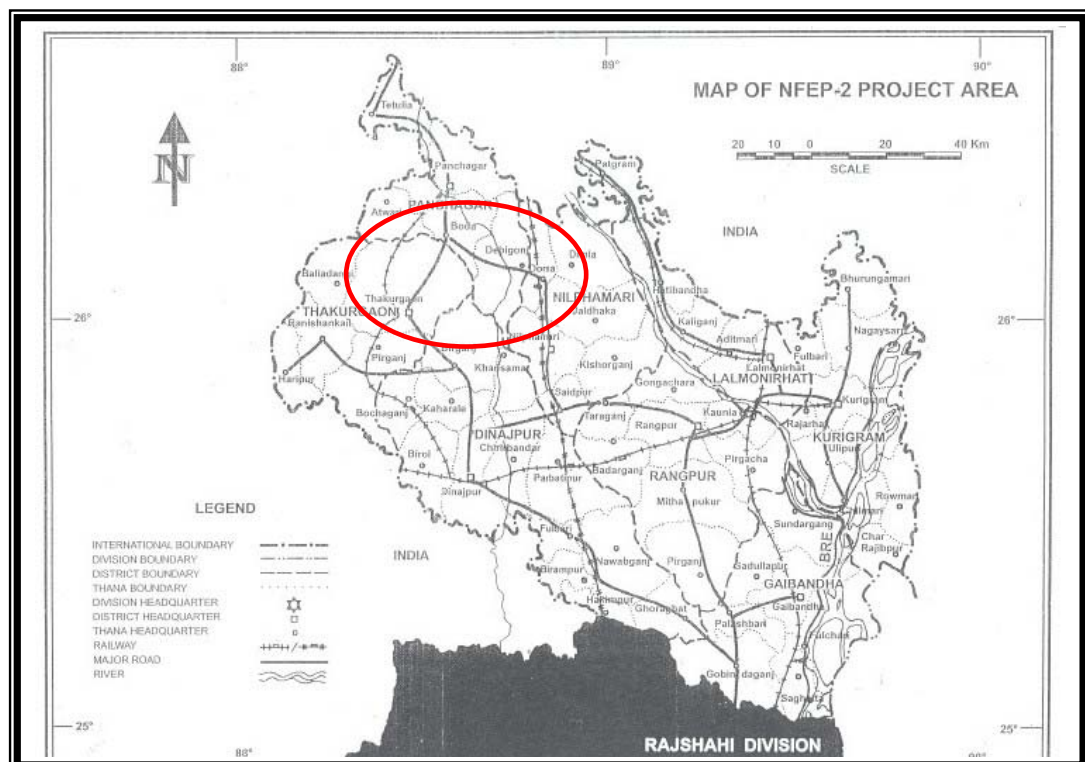
- ❑ uncertainty of fish seed supply
- ❑ availability and quality of fingerlings
- ❑ fish disease
- ❑ insufficient training and extension facilities
- ❑ most ponds are seasonal

- ❑ many ponds are overshadowed by trees and vegetation
- ❑ farmers allow run in and ingress of wild fish into the pond
- ❑ stocking fingerlings in high density with no or little attention to species combination
- ❑ irregular feeding
- ❑ indiscriminate use of insecticides

### **Social constraints**

- ❑ poaching
- ❑ lack of organised marketing system
- ❑ less emphasis on fish production
- ❑ greater perceived risk

To enhance aquaculture growth in the Northwest region, the Parbatipur Hatchery Development and Development Fish Seed Multiplication farms in Dinajpur began in 1988. This was renamed as NFEP in 1992, and provided extension and training inputs in five districts in the region. Following preliminary success, NFEP phase 2 has been approved to continue up until June 2001.



Map 2. NFEP-2 Command Area, with the location of communities circled in red.

The NFEP-2 command area includes the 8 northern districts of Bangladesh with an area of 16,058 km<sup>2</sup> and having a population of 9.8 million (BBS, 1991) There are a total of 20,000 hectares of water area, which includes a total of 88,941 ponds with a water area of 13,365 hectares. NFEP-2 is a bilateral project funded by the Government of Bangladesh and the Department for International Development. The objectives of NFEP-2 were to:

- ❑ Increase fish production using appropriate technologies and methods in particular for the poor and marginal farmers
- ❑ Strengthened DoF, DAE, NGO support services and improve co-ordination and linkage between these organisations with a key focus on training of trainers
- ❑ Test and develop effective fish culture technologies and extension methods particularly suitable for poor and marginal farmers
- ❑ Improve socio-economic conditions of poor and marginal (men and women) through self employment and providing support to facilitate access to credit
- ❑ Supply quality hatchlings to the farming communities and to maintain genetic improvement of brood-stock to eliminate inbreeding and cross-breeding

The project developed infrastructures and established a large hatchery complex with fish rearing and breeding facilities. More importantly, NFEP has now improved training facilities, and is the centre of excellence in the Northwest of Bangladesh.

A number of innovative extension and training methodologies have been tested and developed throughout the project period. GoB Review Committee (2000 p.31) cited that *'implementation of different models through improved technology to increase fish production in the command area has been proved successful'*. 1671 extensionists from a variety of institutions such as DoF; DAE; NGOs; Secondary School Science Teachers; Bankers and Fry traders have been provided with residential training up till June 2000. These key information sources have contacted about 60,728 fish farmers and 43,870 school children (GoB Review Report, 2000). The report has also indicated that fish production in

the command area had increased from 23,030 to 36,284 tonnes showing an increase of approx. 60% over the base line production. In a recent DFID review it was stated that NFEP-2 has been successful in accomplishing aquaculture development in the region as set out as its goal (Frankenburger *et al.*, 2000).

During the inception of NFEP the project was not designed on a sustainable livelihoods basis. In view of this, it was felt to be of crucial importance to study the impacts of aquaculture intervention not only in economic or production dimensions but also in the social dimensions. It is in these contexts that the current study was initiated. There is a need to place the development initiatives in a theoretical framework to actually examine issues of development perspectives. Therefore, a systematic evaluation of interventions promoted by NFEP-2 to capture the social and economic benefits precipitated towards the poor in the past was required to highlight the extent of both achievements and failures, and to illuminate areas to craft future extension programmes based upon the sustainable livelihoods framework.

The study author has been working for the NFEP for over 10 years and has been actively involved in developing and testing fish farming and extension/training methodologies appropriate for the needs of the poor. This was advantageous in conducting any impact study since the investigator has had the opportunity to be very much involved right from the embryonic development to the fully evolved project. Therefore the study has been sponsored by DFID to evaluate the impact of interventions on rural livelihoods to contribute to the development of poverty focused and sustainable aquaculture interventions in the future. The detailed objectives of the study will be discussed in the next Chapter.



## CHAPTER 2: THEORISING THE RESEARCH

In this chapter I will first briefly discuss the evolution of various development paradigms. Then the concepts used in this investigation such as, “Aquaculture”; “Extension”; “Social Development” and “Poverty” will be defined with current understandings and criteria for measuring them laid out. Thirdly, I will focus upon the current status and deficiencies of fisheries extension in Bangladesh in the context of existing development interventions. Fourthly, a model framework of development intervention will be presented where aquaculture as an entry point is proposed and its implications and relationships with extension, social development and poverty are highlighted. And finally, the research questions for this investigation will be laid out.

### 2.1 Development as “Developing” and “Becoming”

The evolution of the concept “Development” can be compared with “social life” which Woods (1999, p.4) stated as *‘ongoing, developing, fluctuating and becoming. It never arrives or ends’*. The meaning of development itself has been changing and developing from one paradigm to another since the term was first coined. The difficulty in defining this loaded word is primarily because of the complexity of the contexts in which it is used causing its’ meaning to vary. Development theories emerged from western economic history, where capitalism and industrial changes underscored the concept. Reflecting back to the 1950s, emerging development theory was based upon the “modernisation” paradigm. The assumption was that development is a linear process of change towards those social, economic and political systems which prevail in so called “advanced nations”. Economic growth, industrialisation and enhancement of agricultural production were the means to achieve it, essentially a technological solution. This was to be measured by economic indicators such as the Gross National Product (GNP) and it was assumed that an increment

in GNP would automatically have a positive impact upon other indicators of development such as rates of infant mortality, education etc. (Gardner and Lewis, 1996; Webster, 1990).

This strategy of development has bred failures to achieve the expected impacts and Ullrich (1992, p.278) rightly cited that *'for the central hypothesis of industrialism, that the unrelenting development of the forces of production will create the conditions for the good life has proven to be false. The attempt to satisfy the full spectrum of human needs through production and consumption has failed'*. He further added that *'those dimensions of life that are important to people - whether West or East, North or South - such as ties of affection with other people and sense of self-esteem in society cannot be replaced effectively by material consumption'*. Pietrese (1998) mentioned that mainstream development has been predominantly trapped in the notion of the economic sphere and the modernization paradigm to the detriment of human and social development.

During the 1970s, the economic concept of development has been criticised both in 'dependency theory', which deals with only macroeconomic change and 'sociological or anthropological paradigms' of development (Bhalla *et al.*, 1997). The dependency theory highlighted underdevelopment (Burkey, 1993). The essence of dependency theory is that capitalism is inequalitarian so that inevitably development occurs unevenly and some parts of the world and some groups are necessarily deprived of development benefits. This can be related both globally and on a societal basis in that the centre benefits at the expense of the periphery (Burkey, 1993; Gardner & Lewis, 1996) and the relationship between the centre and the periphery is clearly one of exploitation.

The concept of the "post development" paradigm has materialised where development of local and grass roots levels of independent action are emphasised but that lacks the wider social perspectives of development. The argument behind this paradigm is that development is not about economic change but it is also a process of changes in the quality

as well as quantity of people's lives (Rahman, 1993; Slim, 1996). The inadequacy of these approaches to development throughout was recognised by development agencies. Indeed, the President of the World Bank accepted this failure and, referring to his speech, Rahnema (1992, p.117) opined that *'the growth was not equitably reaching the poor'*. He further added that *'growth had been accompanied by greater maldistribution of incomes in many developing countries'*.

Alternatively, development can be regarded as that positive change of human well being where human, social and economic needs are being met (Beemans, 1997; Sen, 1999). Indeed development is not just about structural transformation but rather about people and their relationships with the social, economic and political processes (Burkey, 1993). Thereby the shift from economic development to people-first, people-centred development or participatory development has come to the fore, putting greater emphasis on human and social development (Chambers, 1997).

To reflect these ideas a new agenda on poverty reduction has emerged which has been referred to as a "multidimensional approach" (Bhalla *et al.*, 1997; DFID, 1997; UNDP, 1998) emphasising basic survival needs; well being needs and empowerment needs. The International Development Targets (IDT) as set out by DFID, which are encompassed in the Millennium Development Targets, are economic well being; social and human development and environmental sustainability and regeneration (DFID, 2001). To define and target poverty and respond to its' multidimensional aspects, a new path to poverty eradication has emerged, the "sustainable livelihoods" approach. This concept, together with the implications of development theories in technology transfer and development intervention, will be elaborated later, in Section 2.5.

## 2.2 Conceptualisation of Terminologies

Turning now to an in-depth discussion to penetrate below the theoretical surface of the study, I would like to continue by clarifying some terms to be used, their meaning and their implications in this particular research context.

### 2.2.1 Aquaculture

Aquaculture is defined variously as the controlled production, relevant propagation methods and rational rearing of aquatic organisms of economic importance (Huet, 1986; Ameen, 1987). Edwards (1999, p.4) defined “rural aquaculture” as *‘the farming of aquatic organisms by small scale households using mainly extensive and semi-intensive husbandry for household consumption and or income’*. In addition, there are different forms of aquaculture based upon the number of fish species cultured at a time in a pond and these are categorised as either:

**Monoculture:** where one species is reared. (Blakely & Hrusa, 1989).

Or:

**Polyculture:** Where several fish species are stocked that are compatible to each other to utilise ecological niches. This is sometimes referred to as a ‘mixed farming’. (Huet, 1986; Ameen, 1987).

The most important differences between the various methods of fish production lie in the intensity of rearing. Depending on these criteria fish production methods can be divided into three main categories (Huet, 1986; Ameen, 1987):

**Extensive Culture:** Production of fish by using ‘natural food’ supplies in ponds only; stocking density is low; small capital outlay and simple production system (Huet, 1986; Ameen, 1987).

**Intensive Culture:** Production of fish using natural food plus highly nutritious mixed feed; very high stocking density; involves modern techniques of fish culture eg. water quality maintenance, high investment, and production costs to achieve maximum production (Huet, 1986; Ameen, 1987).

**Semi-intensive Culture:** Production of fish using natural food, animal or vegetable waste product; use of fertiliser; rearing of herbivorous/carnivorous species (Huet, 1986; Ameen, 1987).

For the purpose of this study I have considered aquaculture to mean rural aquaculture. The common practice for fish farming in Bangladesh, in particular in the Northwest, is an extensive to semi-intensive fish culture pattern. Considering the fish culture practice in the Northwest region the following indicators were used to measure the level of aquaculture technology in application:

- Pond preparation
- Stocking density of fish species
- Choices of fish species
- Frequency and usage of inorganic and organic fertiliser uses
- Frequency and usage of agro-based fish culture inputs
- Control and management of pond environment
- Patterns of fish consumption and distribution

### **2.2.2 Extension**

Adams (1982, p.1) defined Extension as '*advice and assistance for farmers to help them improve their methods of production and marketing*'. He also added that extension is part of the effort to achieve balanced social and economic development. Although extension is often referred to as the transfer of technology (Cowx, 1988), Van Beek (1997, p.183) opined that '*extension involves more than just new ways of selling technology. It requires a greater understanding of rural communities and individuals, their knowledge, attitudes, skills and aspirations. The challenge is to scratch below the surface and deal with real issues which prompt people to change*'.

To reflect the level of the extension intervention, the following aspects were taken into considerations:

- Targeting (the degree to which specific types of people are selected as recipients of extension actions)
- Provision of non aquaculture information
- Range of extension methods used
- Promotion of aquaculture provision
- Cost effectiveness
- Role of trainer (How the extension worker sees themselves)
- The kind of Training Provision
- Use of extension methods and materials
- Provision of input supply
- Monitoring and evaluation

### **2.2.3 Social Development**

The concept of Social Development is by no means clear. For example, ODA (1993, p.6) referred to Social Development as an approach, which is based upon *‘understanding that the behaviour of each of us is determined not just by economic rationalism’*. Eyben (cited by Chambers 1995, p.vii) suggested that *‘social development is a means to enhance individual and community well being, and autonomy, within an integrated, equitable and just society’*.

Kishindo (1997, p.11) explained social development as *‘a process which ensures the availability of resources, knowledge and power to members of society to enable them enjoy an acceptable standard of living’*.

However, for this study, “social development” is taken to mean those changes, which maintain or generate social structures and which have the potential to impact upon

individual and group well-being. We will consider the following areas as integral to social development:

- Social structures (Links to institutions, networks and services)
- Social capital (kinship, patronage, solidarity, reciprocity, collective action)
- Power relationships (within and between groups)
- Closeness to social services (main centres and peripheral offices)
- Existence of outside development interventions in the community

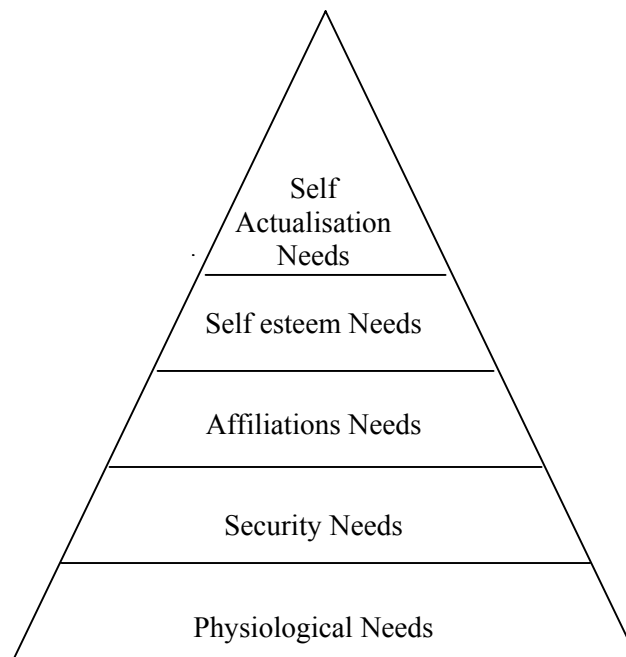
#### **2.2.4 Poverty**

In the past, poverty was considered as an absolute economic attribute and income poverty was the key aspect for defining and measuring poverty. During recent years, research and development about the meaning and measurement of “poverty” has been at the top of the agenda, in particular, for governments, donors and development agencies.

The greatest shift in the concept has led to the notion of development having to include social deprivation and social exclusion (Sen, 1992), which clearly indicates that poverty is not bounded only in the economic sphere (Glewwe *et al.*, 1990). It has been recognised that poverty is a complex phenomenon (Maxwell, 1999; UNDP 1999a). Development specialists have considered the term “poverty” in various ways, for example Chambers (1995, p.19) defined poverty as a *‘lack of physical necessities, assets and income. It includes, but is more than being income poor. Poverty can be distinguished from other dimensions of deprivation such as physical weaknesses, isolation, vulnerability and powerlessness with which it interacts’*.

During the inception phase of the research it became clear that a working definition for “Poverty” would be required. The multi-dimensional facets of poverty had to be fully explored (Chambers, 1995; World Social Summit conference, 1995; Mukherjee, 1996; Wickramasinghe, 1996; Carney, 1998; Ashley & Carney, 1999) in this study.

As Rahman & Hossain (1995) considered that poverty can be defined in terms of basic needs recourse was taken to Maslow's hierarchy of human needs (Maslow, 1968, see Figure 2.1) to generate a list of possible indicators. Thus, a person might be described as impoverished if they lacked the means to address any need that fell within the hierarchy as: **Physiological; Physical** (Security); **Affiliation** (Belonging); **Self-esteem** and **Self-actualisation**. Beemans (1997) expressed similar views when he averred '*Many people in most cultures start at the other end of Maslow's scale: at the most personal level, they are moved by deep underlying moral and spiritual assumptions that reflect and explain reality and support the values that guide their decisions about whether to change or not to change*'.



**Figure 2.1: Maslow's hierarchy of needs**

The present study argues that measures of poverty should cover the full range of human needs from physiological through to self-actualisation needs. Therefore, this study considers Physiological needs to include *food levels, drinking water*; Security needs: *housing, latrine and health and medical options*; Affiliations needs: *membership and representations, participation in various activities*; Self esteem needs: *decision making*



*participation in technology development; and Self-actualisation needs: education and training, mobility, cultural pursuits and recreation.*

### **2.3 Current status of Fisheries Extension in Bangladesh**

The following section will reflect upon the current situation and development of fisheries extension approaches and ‘technology transfer’ mechanisms in Bangladesh, in particular in the Northwest context.

The fisheries extension scheme in Bangladesh was begun in the early 1960s, the major focus was to develop infra-structural facilities and create provision of logistic support (UNDP, 2000).

It is to be noted that the current public sector, fisheries extension approach actually evolved from the Training and Visit system (T&V) of agricultural extension that has been run since the mid 1970s (Axinn, 1988). The basic assumptions behind this approach are that extension workers are poorly trained, not up to date and rarely visit farmers. The purpose of this approach was to influence farmers to increase production of certain crops. The major strategic principles of the T&V approach to extension as stated by Axinn (1988) are as follows:

- Fixed schedule of extension worker’s visit to farmers
- In-service training for field staff (usually on a 2 weekly basis) in the current technical message, delivered by Subject Matter Specialists
- Extension service is unified and monolithic
- Local extension workers work intensively with individual contact farmers who are then expected to spread the technical messages to other neighbouring farmers
- Timely supplies of inputs and credits
- Research conducted in specialist stations and links dependent upon extension workers reporting problems and success in the field

From this legacy, run within the Ministry of Agriculture, a demonstration method of extension based on T&V was very widely adopted and used by the DoF to disseminate improved fish culture technologies. In the fisheries sector there has recently been a shift in extension approach towards popularising the group and community based extension approach to maximise benefits with limited manpower (sic) (Yahaya, 1992; Sen, 1993). To support field level extension programmes, intensive training on communication skills and on technical aspects was provided to the field level extension officers during recent years through various projects. Group and community based extension approaches are generally mostly used by NGOs.

The following are detailed descriptions of some of the extension approaches that are in operation, with particular reference to the Northwest region of Bangladesh.

### **2.3.1 The Trickle Down Extension System**

Realising the importance of extension needs the FAO and the UNDP piloted this approach to extension. This project was launched with the DoF under the auspices of the Ministry of Fisheries and Livestock. The TDS approach to extension was developed and extended during 1990-93. By encouraging results Government of Bangladesh extended this programme with Government funding nation wide in 1996 (Kumar, 1999). The trickle down extension system is characterised as a participatory extension approach aiming to demonstrate and disseminate aquaculture technology among farmers (Kumar, 1999). The method and result demonstration techniques are being used coupled with individual and group methods of extension. The approach also emphasises good working relationships between all parties involved in the extension system (UNDP, 2000). The objective of the project was to increase overall fish production and at the same time it was assumed that the demonstration of the programme would have a trickle down effect to the wider fish farming community. In this approach farmers have been encouraged to stock at low densities and utilise locally available resources on a regular basis. The project proposed to train 1329

Extension Officers (EO) and 12,000 Result Demonstration Farmers (RD) and 60,000 Fellow Farmers (FF) through this approach (Islam, 1999).

In this approach, one farmer has been selected to be the “Result Demonstrator” (RD), the master farmer, and another 6 neighbouring farmers have been selected as “Fellow farmers”(FF). The RD and the FF received three days fish culture training in two phases by the local EO (the Upazilla Fisheries Officer). The local UFO also paid frequent follow up visits to the “RD”, in particular, to establish and run the demonstration programme, so that the ‘RD’ can assist and support the ‘FF’s from neighbouring farming communities.

The important criteria for the selection of RD farmers are sketched below (Kumar, 1999):

- the farmer has to own a pond
- leased ponds should have a long lease period
- the pond should be suitable for fish culture
- farmer selection should be made from all levels of farmers
- educated farmers should be given priority
- farmers should be motivated and creative and willing to spread the skills learnt
- women farmers should be encouraged
- pond location is to be considered for greater demonstration effect
- the farmer will have to pay all inputs required for fish farming
- School teachers, imams and unemployed youths are given preference
- the farmer will have to follow the instructions given by the extension officer

Some of the major responsibilities of the result demonstration farmer are outlined below:

- maintain regular contact with the extension officer
- select fellow fish farmers from their own locality
- demonstrate basic techniques of fish farming learnt through this programme
- pay regular visits to fellow fish farmers

- inform any problems to the extension officer

With the preliminary success of the pilot project, this project had another phase to extend it as a nation wide programme, which continued until 1999. The project indicated that fish production from result demonstration ponds had increased from the average pond production level of 1.461tonnes/ha/year to 4.104 tonnes/ha/year (UNDP, 2000). This extension approach has been awarded the FAO Edward Saoma award in 1995/96; 1996/97 and 1998/99 for its noteworthy contribution to aquaculture development in Bangladesh.

The innovation and implementation process as described by UNDP (2000) are as follows:

- Selection of appropriate technology
- Training for RD fish farmers, FF farmers and field training for government field counterparts
- Comprehensive aquaculture training for Upazilla Fisheries Officers, Assistant Upazilla Fisheries Officers and Field Assistants.
- Operational training/workshop for senior government officers
- Computer training for the headquarter officers on management information systems
- Demonstration
- Operational workshop and participatory training
- Dissemination of trickle down approach.

### **2.3.2 Demonstration Farmer Programme**

This builds upon the very common and popular method involved in the dissemination of basic fish culture techniques widely used by the DoF before the refinement of the Trickle Down Approach. To maximise benefits of extension there were provision of method, result demonstrations and the ‘farmers day rallies’. The overall implementation strategy was similar to the principles of the “T&V” system of agricultural extension.

The Northwest Fisheries Extension Project (NFEP) launched its own version of this programme in 1992. The assumption was that demonstration of basic fish culture techniques would prove viability; potential benefits of fish culture and that result will eventually discharge through sideways diffusion. Although the strategy for implementation of the NFEP demonstration programme was slightly different from that used previously, and within the Trickle Down Approach, the philosophy was similar.

It is important to mention that the emphasis of selection for NFEP demonstration farmers was poverty. Poorer farmers were selected following the wealth-ranking methodology formulated by Grandin (1988). Farmers have also been supported with refundable credits or inputs.

The general implementation strategy of the demonstration programme are traced below:

- Village selection
- Farmer selection by poverty ranking methodology
- Interested and single pond preferably with out dispute
- Training
- Intensive follow up visits
- Farmers day rally at successful sites
- Monitoring and evaluation of the programme
- Annual workshop with the extensionists

### **2.3.3 The Model Fisheries Village Programme (MFVP)**

The Model Fisheries Village programme (so named because it seeks to create an ideal situation) is a community-based approach to extension. This extension approach was piloted by NFEP in 1995 with a view to evolve cost effective extension methodology taking in to consideration recommended participatory development techniques (Reijntes, *et*

al., 1992). This is a programme where there are no direct inputs and no direct credits. The major essences of this approach are:

- all the pond owning community to benefit, irrespective of wealth category
- open up choices
- process is explained
- provide opportunities for dialogue
- farmers are drivers
- encourage to try out new things

The objectives of the programme were to provide extension services to all categories of farmer, in particular, to a large number of poor and marginal farmers in a short period of time and considering the shortage of manpower in many institutions. This was a limited input extension programme. It organised motivational meetings, training and field visits were undertaken but no physical inputs were provided. In particular, no defined package of technology was presented and efforts were made to assist community people to plan for themselves and to choose options that suit them. Bhuiyan (1999, p.17) stated that '*a group method or community based method or a model village approach for pond aquaculture seems to be most acceptable one resulting in good practice*'.

A brief outline of the model village extension strategy is discussed below:

In the first year of implementation, intensive support is being provided to the community and major stages are sketched below (Model village guidelines, 1996; Chowdhury and Islam, 1996):

- Cursory survey of pond resources
- Motivational meeting
- Village selection
- Group leader selection
- Establishment of fish club

- Baseline survey
- Training in three phases (Men and Women)
- Monthly meeting and follow up visits
- Farmers' day rallies
- Record keeping
- Annual monitoring and workshops

In the second year supports are slowly withdrawn and are as follows:

- Organisation of Refreshers course
- Monthly visit and follow up
- Quarterly meeting
- Record keeping
- Biannual evaluation

With the encouraging results in 1995, this programme was extended to 8 northern districts within the NFEP command area. It is important to note that this extension approach has been replicated nationwide and is being implemented currently through the Fourth Fisheries Project (A significant multilateral project).

#### **2.3.4 The Fry Traders Programme (FTP)**

Fry trading in the command area, like other regions, has been an age-old fish culture activity. NFEP had identified fry traders as being important potential informal extension agents in aquaculture development since these traders are supplying fish seed to over 90 % of fish farmers in the NFEP command area. The fry traders' programme was launched in 1990 and extended gradually to the whole NFEP command area in 1996. Fry traders are being trained by the project. The objectives of the programme are:

- To develop fry traders as informal extension agent
- To improve socio-economic conditions of fry traders
- To disseminate simple fish culture messages to a wider population

- To test and develop cheaper methodologies for aquaculture extension

A large numbers of farmers have been contacted through the trained fry traders in the Northwest region.

The major steps followed in the implementation programme are mentioned below (NFEP year plan, 1997):

- Fry trader selection
- Training given
- Organise debriefing sessions
- Follow up visits to fry traders contact farmers
- Monitoring and evaluation
- Annual workshop
- Residential training for best fry traders

The usefulness of fry traders as an extension agent has been recognised fully (Thompson *et.al.*, 2000; GoB Review, 2000).

### **2.3.5 The Secondary Schools Aquaculture Support programme (SSASP)**

This programme originated in 1994, since the project identified school science teachers as potential extension agents for aquaculture. The main objectives of the programme were:

- increase knowledge and skills of the science teachers
- utilise these trained teachers as extension agents and
- establish the school pond as a learning resource to the school and community.

A brief outline of the strategy for implementation of the programme are given below (NFEP year plan, 1997):

- School selection
- Head teachers' workshop
- Training for selected teachers



- Follow up visits to schools
- Monitoring and evaluation of programme
- Annual workshops
- Recognition of schools with better performance

The project has trained about 261 teachers so far and those teachers are themselves teaching about 42,875 students about aquaculture. A recent impact assessment study showed that trained teachers had been providing improved quality training and at the same time on average each trained teacher has been motivating and advising about 10 people for fish culture within the community in a season.

Following impressive results the programme has been expanded to cover the whole NFEP working area in the northwest regions of Bangladesh. The Fisheries Training and Extension Project (a bilateral project of the Government of Bangladesh and DFID) have replicated this programme to other regions of the country.

### **2.3.6 The Rangpur Dinajpur Rural Service (RDRS)**

After the independence war in 1971 a number of national and international agencies started to repair the country. RDRS started to work as Cooch Bihar Refugee Service to rehabilitate war victims and helpless people. In 1972 it was renamed as Rangpur Dinajpur Rehabilitation Service (RDRS). CARITAS, CARE and other smaller NGOs have started to work at a much later stage in the Northwest region. CARITAS has been working in line with RDRS but covering a lesser area. On the other hand, CARE has been working on a project basis. RDRS was one of the first of many NGOs, national and international, which responded to the Government's request to provide relief and rehabilitation, later to combat the rampant poverty and backwardness prevalent throughout the country via long-term comprehensive development programmes. It was the only agency to choose to work in the far Northwest, a remote and neglected region (RDRS Annual Report, 1996).

RDRS continued its effort on relief and rehabilitation between 1972-75. It then started a sectoral development programme from 1976 and continued upto 1987. Again RDRS changed its name to Rangpur Dinajpur Rural Service in 1985. During 1988-96 RDRS launched a comprehensive development programme. The goal and purpose of RDRS for 1996-2000 is:

*‘To ensure sustainable increases are achieved in the living standards of the rural poor.*

*To ensure the rural poor possess and apply necessary skills, understanding, confidence, institutions, services.’*

(Annual Report 1996, p.10)

The following programme components have been launched to achieve the above objectives and are outlined below (Annual Report 1996):

- People’s Organisation and Mobilisation
- Women’s rights and Gender Awareness
- Education
- Primary Health Education and Services
- Credit assistance
- Agriculture
- Employment generation
- Environmental Management and Community Resource Development
- Disaster preparedness, Management and Development of Vulnerable Communities

Recently, RDRS has received a EURO 2000 award for developing an innovative model of integrated homestead farming compatible with the capabilities of the rural poor, which is now in operation in North-west Bangladesh.

## 2.4 Current challenges of Fisheries Extension

The following section sets out to discuss the principles and recent developments in extension education.

The importance of launching development projects to foster aquaculture development countrywide has been fully recognised to fulfil the increased demand of fish supply. Efforts have been made during the recent past to welcome development projects to strengthen extension capacities of the DoF. The Government of Bangladesh has been encouraging fisheries extension programmes in the revenue sector. There has been growing need for the development of participatory and demand driven extension intervention to achieve sustainable impacts of extension. In 1999-2000 fiscal year there were 34 fisheries development projects (Langworthy *et al.*, 2001) being implemented under the auspices of the Ministry of Fisheries and Livestock, with a view to strengthen extension and training capacities of the DoF to provide services to the mass people on a sustainable basis.

In Bangladesh, as in many other developing countries, there are limitations in public sector extension. Despite the huge potential of this sector, the motivational program to create awareness among the mass of people, and the extension support services provided by the fisheries department, are very limited (Islam & Moniruzzaman, 1999). Similarly, Ahmed and Chowdhury (1999, p.8) pointed out that '*extension efforts of DoF both in revenue as well as development set up are still inadequate*'. Chowdhury *et al.*, (2000,p.7) had a similar viewpoint and specified that '*the present set up of the department of fisheries at the Thana Level is too small and inadequate for positive extension work*'.

While rethinking aquaculture for resource poor farmers in Bangladesh, Lewis (1997) pointed out a number of fundamental weaknesses of the DoF extension service, as follows:

- Only one UFO and assistant per Upazilla with inadequate incentives or means to visit farmers;

- A production oriented, ‘top down’ approach with little interest in poverty focused work or opportunity for participatory problem solving with farmers;
- No overall strategy for developing aquaculture extension activities and a tendency to respond to externally imposed (i.e. project) agendas.

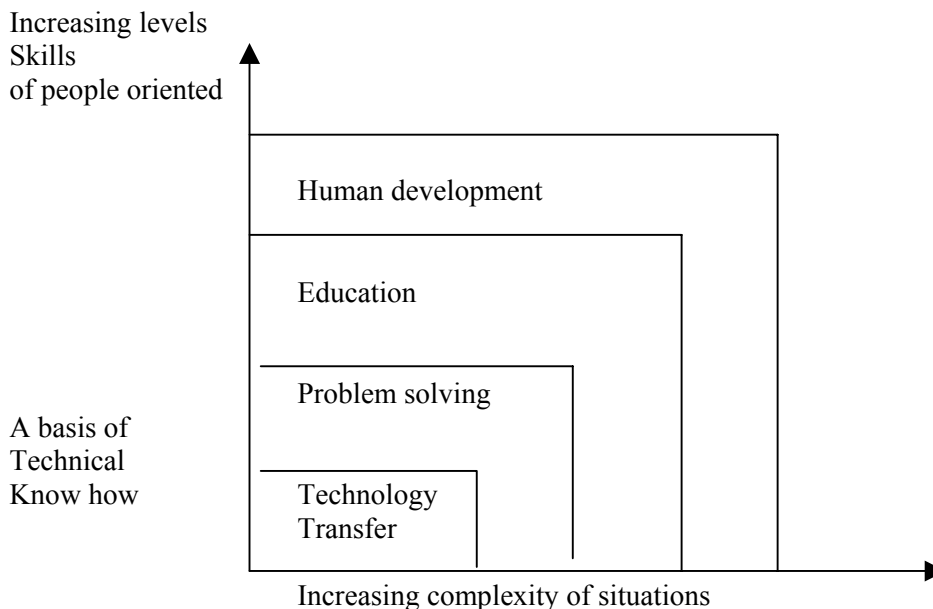
As reported earlier, the fisheries extension services scheme in the Department of Fisheries commenced in the early 1960s (UNDP, 2000). Aquaculture Extension in Bangladesh in the recent past has made substantial progress. No fixed extension system is suitable for all areas, however. Agricultural development is a dynamic process and therefore extension systems must be flexible and open to change (Sen, 1990). None of the extension approaches set out above is suitable for all in terms of objectives and targeting (FAO, 1989). Traditional extension systems are being challenged throughout the globe. In Bangladesh in the recent past there has been an emphasis on project based extension systems. The principles of the T&V systems of agricultural extension have been the main strategy of fisheries extension. Each extension approach has its own limitations. The common and widely used T&V system of extension has also merits and demerits. One of the weaknesses of the T&V approach to extension in Bangladesh is a failure to respond to the poor farmers’ needs and potentials (Scarborough *et al.*, 1995). Edwards (1999, p.34) stated that *‘direct or “top-down” transfer of technologies to poor farming households is likely to be ineffective’*.

The perceived traditional role of Extension for development ‘transfer of technology’ has been criticised. Thus Allison (2001, p.936) rightly commented on the *‘prevalence of production oriented development paradigms, leading to neglect of sustainability issues’* as one of the reasons for failure of current fisheries management. The understanding of the local context of people’s livelihoods and their resource endowment has been seen as a critical factor in successful development. The perception of the extension agent as a “knowledge bank” has been questioned. To increase the impact of Extension, a relationship

of true dialogue is essential. A shift in adult-child to adult-adult type of complementary transactions is vital (Stewart & Joines, 1987; Sen, 1990; Garforth, 1995; Van Beek, 1997) for effective communication and thereby improvement or uptake of productive technology. People are likely to respond actively on issues when they recognise their own problems (Barrow, 1996). Findings from earlier studies on Extension impacts indicate that the cascade effects of ‘trickle down’ of information and influence did not show significant results (Duvel, 1988; Sen, 1993; Christoplos *et al.*, 2000, Chowdhury *et.al* , 2000).

Van Beek (1997) argued that there are four dimensions of Extension which are as follows (Figure 2.2):

- Technology transfer, which links research in one discipline with users;
- Problem solving; which assists clients with solving individual problems;
- Education, which aims to empower people to solve their own problems; and
- Human development, which encourages people to develop learning capability and govern themselves.



**Figure 2.2: Extension in Complex Situations (Adapted from Van Beek, 1997)**

None of the four dimensions can be safely ignored and have equal value when effectiveness is to be considered (Van Beek, 1997).

Cox *et al.*, (1998, p.27) stated that *'there is a growing recognition that extension services need to be pluralistic and more demand driven than hitherto'*.

Again, the current role of Extension has been challenged both in terms of its approach and in targeting. It can not provide support services to a large number of rural poor (Sen, 1990; Cox, *et al.*, 1998). Haylor (1998) specifically mentioned about the conventional T&V systems of agricultural extension for technology demonstration in aquaculture with assumptions that demonstrated technology will trickled down to neighbours but have achieved limited success and are being questioned. Chowdhury *et al.*, (2000, p.6) were concerned that *"top down" approach characteristic of traditional development strategies has largely failed to reach and benefit the rural people'*. Haylor (1998, p.4) cited that *'we must take account of what people have and what they want, otherwise who are we working for?'*

Moreover, current technologies are needs based rather than strengths based. The outcome is a dependency on extensionists instead of supporting resourcefulness. Commenting on targeting the poor through Extension. Edwards (1999, p.34) stated that *'direct or top down transfer of technologies to poor farming households is likely to be ineffective'*. Technologies need to be compatible to the local conditions in particular for improving livelihoods of the poor (Demaine, 1999).

The needs based approach may not be appropriate for a majority of farmers (Haylor, 1998). The strength-based approach develops farmers/communities who can gather information from a variety of sources; can apply techniques; can understand the information; experiment for themselves systematically; can use networks for exchanging ideas/results and who are not risk averse. The outcome is development of self-esteem and confidence

that should be the target for development through Extension. As Van Beek (1997, p.2) said '*extension is about development and development is about people*'. The role of Extension includes much more than dissemination of information (Sen, 1990). Rather, Extension is about effective communication; educating farmers; empowering people and assisting them to seek livelihood options and building farmers' capacities to so that they can influence developments to shape their own livelihood (Korten, 1980; Chambers, 1993; Hagman *et al.*, 1996; Van Beek, 1997; Simpson, 1999).

Reflecting upon the current thinking and shifts in Extension it is revealed that the present Fisheries Extension system has the following distinct challenges (NAEP, 1996; Gupta and Shah, 1994; Lewis, 1997; Sen, 1990; Oakley *et al.*, 1991; Van Beek, 1997; Chambers, 1994; Datt and Ravillion, 1998; IFAD, 1998; Bhuiyan, 1999):

- Firstly, to design participatory extension and training approaches to reach all categories of farmers including men and women so that extension indeed becomes need based and covers all categories of people.
- Secondly, launching of poverty-focused approach to extension to discharge aquaculture development benefits proportionately.
- Thirdly, to include socio-economic and organisational issues along with the technical aspects in constructing extension programmes for sustainable livelihoods.
- Fourthly, for extension providers to change in their attitudes i.e. to listen and learn more from the farmers and to act based upon community needs since rural people have more technical expertise than is usually recognised.
- Fifthly, technologies need to be developed and modified locally to impact upon the rural people's livelihoods on a sustainable basis.
- Sixthly, establishing linkages between research and development agencies for rapid and effective dissemination of useful information on appropriate interventions.
- Finally, but most importantly, technology packages need to be coupled with provision of easily available credits and marketing.

In the following section I would like to focus upon the recent developments in development intervention.

## **2.5 Current thinking on Development Interventions**

It is clearly mirrored from the above discussion that Extension in the early 1980s was dominated by the T&V system (FAO, 1990) based on transfer of technology and about which Chambers *et al.*, (1989, p. xix) said that *‘priorities are determined by scientists, who generate technology on research stations or laboratories, to be transferred through extension services to the farmers’*. This is popularly known as the “blue print” approach.

It then shifted to a ‘farmer first’ approach which was described by Chambers *et al.*, (1989, p. 182) as *‘the main objective is not to transfer known technology, but to empower farmers to learn, adapt and do better; analysis is not by the outsider-scientists, extensionists, or NGO workers-on their own but by farmers and by farmers assisted by outsiders’*.

Thereafter it moved to a more production-oriented approach followed rapidly by the integrated rural development approach. The assumption underpinning this was that through adoption of improved technologies, the farm productivity increases will automatically impact upon people’s livelihoods and well-being. This can be compared to the concept of “modernisation” as development, where technological intervention has production as a core value. The assumptions remain the same, that increase in production will lead to an increase in well-being.

Ullrich (1992, p.278) rightly said that *‘for the central hypothesis of industrialism, that the unremitting development of the forces of production will create the conditions for the good life has proven to be false. The attempt to satisfy the full spectrum of human needs through production and consumption has failed’*. The failure of the current economic, technology driven development paradigm has also been recognised by Beemans (1997). Therefore a



major concern was raised that, following the opinion of Gaiha, (as quoted by Datt & Ravillion 1998, p.63) *'acceleration in agricultural growth by itself is unlikely to make a dent in rural poverty'*. Therefore, a shift had to occur in the fisheries sector, as Allison (2001, p.935) mentioned that *'development assistance in the fisheries sector has shifted from production- oriented modernisation programme towards resource conservation and support for sustainable livelihoods'*.

And thus Pieterse (1999, p.63) suggested that *'[the] development process takes place across dimensions - physical, ecological, social, emotional, mental, political, historical moral and semantic'*. He further added that *'development refers both to a process (as in 'a society develops') and an intervention (as in 'developing a society')*. Rahman (1993, p.207) proclaimed that *'the development of creative abilities and their fulfilment in economic, social and cultural spheres is perhaps the most basic element of human development'*.

Up until this point, technologies and production had been the focal point for development interventions. However, in order for the rural poor to benefit fully from these interventions it became necessary for a more holistic appreciation, achieved through a contextual analysis that includes an emphasis on people, to underpin actions on the ground. The result was the emergence of the holistic concept of “sustainable livelihoods”, which was documented by the Brundtland Report (WECD, 1987). The concept puts people at the centre of development and considers 5 different types of assets (capitals) upon which people draw for their livelihoods. It also includes consideration of the vulnerabilities and the impacts of policies, institutions and processes, by which the rules of the game that govern the range of ways that capital assets can be built upon or are undermined.

The concept therefore developed as a popular one and has been actively and widely used by several donors and development agencies. Carney (1998, p.4) defines a sustainable livelihood as one which *'comprises the capabilities assets (including both material and*

*social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance it's capabilities and assets both now and the future while not undermining the natural resource base'.*

To impact upon poor people's lives a broader analysis of farm//household/community which is based upon certain principles becomes essential. The DFID core sustainable livelihoods principles are (DFID, 1998):

- People-centred
- Responsive and participatory
- Multi-level
- Conducted in partnership
- Sustainable and
- Dynamic

An SL approach stresses the importance of understanding various livelihood components and factors, such as those listed by Ashley and Carney (1999) as:

- The priorities that people identify;
- The different strategies they adopt in pursuit of their priorities;
- The institutions, policies and organisations that determines their access to assets/opportunities and the return they can achieve;
- Their access to social, human, physical, financial and natural capital, and their ability to put these to productive use; and
- The context in which they live including external trends (economic, technological, demographic etc), shocks (natural or man made), and seasonality.

This is similar to what Pieterse (1999, p.82) in his Tao of development theory referred to as *‘elements of Tao development; a sense of balance across dimension, a holistic approach, a notion of collective healing’*.

Following on, the significance and importance of fish culture in a regional context in terms of rural livelihoods cannot be taken in isolation, in particular, for the resource poor farming communities (FAO, 1997; Frankenburger *et al.*, 2000). More importantly it is crucial to look at households from a more holistic viewpoint since resources are limited. Haylor (1998, p.4) rightly mentioned that *‘aquaculture is a single part of a complex livelihoods system’*.

Some positive assets exist in aquaculture in particular in areas of natural and physical capital but those need to be reoriented to benefit the rural poor. Both GOs and NGOs have to stand and look for strengths in considering aquaculture as a means of poverty reduction and act accordingly.

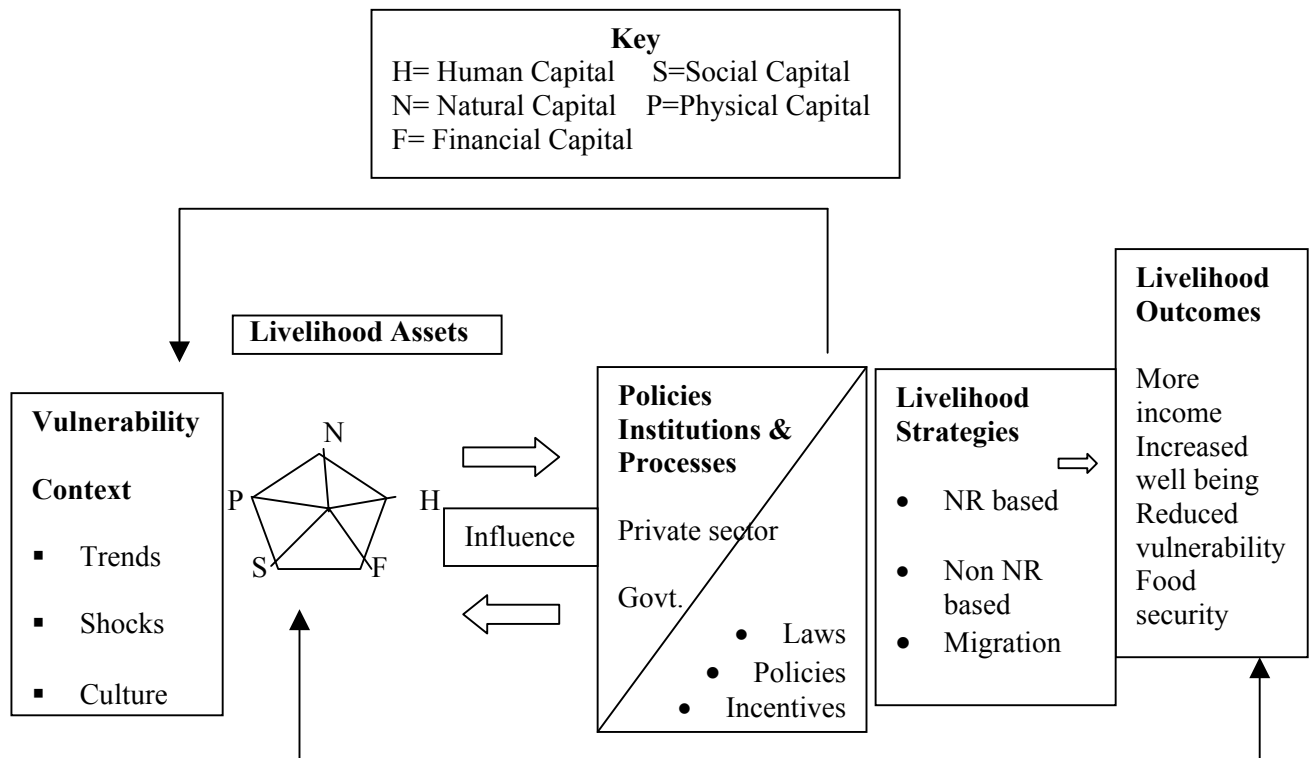


Fig 2.3: Sustainable Livelihood Framework (After Carnev 1998).

The vulnerability context in aquaculture in the Northwest context includes the poor quality of fingerlings, sudden floods, droughts, theft, poisoning, disease and influx of wild, predatory species. In terms of the Policies, Institutions and Processes affecting aquaculture, for example middlemen (sic) exploit the farmers' share of fish prices, the extension agencies tend to favour the more resource rich farmers, culture can limit the involvement of women, multiple pond ownership can prevent optimal use of ponds, and rights to public water bodies restrict pro-poor exploitation of the resource.

## **2.6 Social capital and Poverty, a means to an end**

Poverty reduction has been a challenging issue and has been identified by Governments, donors and development agencies in the developing countries again and again. Recent developments on social capital have demonstrated profound impact on poverty alleviation (Grootaert, 1998; Bebbington *et al.*, 2000; Chopra, 2001). Grootaert (1998, p.3) mentioned that *'there is growing evidence that social capital can have an impact on development outcomes - growth, equity and poverty alleviation. Associations and institutions provide an informal framework to organise information sharing, coordination of activities, and collective decision-making'*. The growing role of social capital in overall social development or community development has proved important and is emphasized by development specialists (Hayard, 1987; Dhesi, 2000) as a glue to hold together the various elements of development (Chopra, 2001). Bebbington *et al.*, (2000, p.20) stated that *'building social capital is, however, a very important dimension of the challenge of development: to understand and strengthen the social foundations of sustainability'*. Morris (1998, p.7) pointed out that *'in the context of poverty, social capital can be seen as either a means to an end or as an end in itself, depending on the definitions of poverty'*.

In this section I will put forward recent work in this area as articulated by development specialists, to highlight the crucial role of social capital in rural development and, in particular, in poverty reduction.

The OECD (2001) indicated that research links social capital, and access to such capital with:

- Improved health
- Greater well being
- Better care for children
- Lower crime
- Improved government

Transfer and sharing of information is a critical challenge in development (Collier, 1998), in particular, in order to provide extension service to the vast majority of poor people in rural communities, social capital can enhance the flow of information both horizontally and vertically (Narayan, 1999). It can reduce transaction costs (Christoplos *et al.*, 2000; Serageldin *et al.*, 2000) and can play a key role in poverty alleviation by sharing information (Grootaert, 1998).

Creation of various capitals has been a major emphasis in achieving sustainable rural livelihoods and efforts are being made to incorporate means of creation of these capitals within rural development strategies. Social capital can create and enhance the efficient utilisation of other capitals (Coleman, 1988; Grootaert, 1998). Thus, Grootaert (1998, p.6) mentioned that *'one of the important attributes of social capital is that it can make the other types of capital and their productive combination more efficient'*.

Townsley (1998, p.144) opined that *'the potential contribution of aquatic resources to rural livelihoods is often limited by a policy environment that fails to develop the kind of*

*vertical and horizontal linkages which are especially important for the aquatic resources sector’.*

Poor people generally have less time, a lower physical and financial stock. Therefore, it seems that poor people may rely more upon social capital than the rich, an idea that was clearly mentioned by Collier (1998) while discussing implications of social capital on poverty. Trust among and between community members can create and reduce opportunity costs (Krishna & Uphoff, 1999). Following the opinion of Dasgupta, Grootaert (1998, p.5) mentioned that *‘associations reduce opportunistic behaviour by creating repeated interactions among individuals, which enhances trust’.*

Diversification of livelihoods has been identified as one of the important strategies for higher impact upon poverty through reduced vulnerability (Frankenberger *et al.*, 2000 Allison & Ellis, 2001; Ellis 2001). Building linkages can enhance these strategies and networking with other groups/agencies. The role of social capital in building such relationships and linkages is significant. Thus Bebbington *et al.*, (2000, p.11) stated that *‘the quality of people’s social relationships influences their sense of well-being. And social relationships and networks are resources that help people to pursue their livelihood and solve development problems’.* They added that *‘networks and organisations can enhance poor people’s access to different types of markets and increase the income they derive for their assets’.*

Empowering people has been a key slogan in development. Facilitating the development of appropriate social capital can enhance the process of empowerment. Bebbington *et al.*, (2000, p.16) indicated that *‘building social capital is a central element of empowerment - and empowerment is in turn central to poverty reduction, as both a means and an end.’*

Shocks and vulnerability are major risks for poor people and have frequently been faced by these groups. The creation and enhancement of the ability to face these challenges is a critical element of any poverty reduction strategy. Formation of social capital can help people to cope in such crises. Dhesi (2000, p.203) opined that *‘ a community’s ability to cope with stress, engendered by the development processes, depends upon its material well-being and its stocks of social capital.’*

The multi-dimensional attributes of poverty have been fully recognised. Meeting higher levels of need can often be achieved through making relationships and building social capital. As Bebbington *et al.*, (2000, p.14) cited *‘good social relationships are the foundation for many everyday activities, such as recreation’*. Allison & Ellis (2001, p.380) said that *‘social relations can also determine who has access to fishing opportunities.’*

So, for the purposes of this study, let us take Social Capital to be primarily a subset of the results of *‘non-market interaction of agents which nevertheless has economic effects’* and *‘a subset of these social interactions, including only those which either are themselves durable or the effects of which are durable.’* (Collier, 1998 p. 2 & 6). These can be regarded, within the communities under study, as kinship, solidarity, reciprocity and collective action within and between community members. In addition, social capital means promoting exchanges of shared values, in particular information exchange and dissemination between various categories of people within the community. Allison & Ellis (2001, p.385) stated that *‘Rather than trying to use concepts of territory, social structure or shared values, an institutional approach focuses on the ability of groups of people to create and enforce rules - rules that are the product of social negotiations, economic and political forces’*.

Let us also recognise that social capital comes in both positive, enhancing forms and in negative, detrimental ones (for example participation in criminal actions, corrupt practices etc.). Clearly it is the growth of the positive ones that will concern us.

With regard to measurement of social capital, a pragmatic approach needed to be taken based upon observation, and respondents' own opinions regarding issues such as community members' participation in various organisation and agencies, perceptions of levels of solidarity, reciprocity, trust and collective action, triangulated between different respondent groups.

## 2.7 Is Aquaculture a means to poverty reduction?

Now I will turn to the role of aquaculture and its significance in poverty reduction. In the following section a review is made of the theoretical understanding of impacts of aquaculture on poverty and sustainable livelihoods in the current situation on a wider scale.

Bangladesh has the most productive freshwater fisheries in the world (ITDG, 1993) and the importance of aquaculture has been growing fast. Aquaculture, indeed, has been an inseparable livelihood activity for many of the Bangladeshi people. The importance of aquaculture is growing fast, in particular, with the rapid decline of wild fish in natural water bodies and the concomitant growth in population. It is worthy mentioning that most people perceive aquaculture as having tremendous potential, not only as a source of food but having a multi-dimensional benefit. Aquaculture and aquatic resources are contributing to nutrition, food security and sustainable livelihoods in Bangladesh (DFID, 1999). The remarkable decline in natural and wild stocks of fish in recent years is creating motivation for involvement in aquaculture for a majority of farm people. Specifically the resource poor farmers are experiencing pressure on their protein consumption. Therefore, the significance of aquaculture upon their livelihoods has been increasing. In the past, aquaculture resources have been overlooked since supplies from natural sources met the demands of rural people for fish. Fishponds were not utilised fully nor fish farming even thought of as a significant occupation to produce fish to support livelihoods.



Edwards *et al.*, (1996, p.24) stated that *'aquaculture has considerable potential to contribute further to farm household welfare in most of the humid tropics'*. Edwards (1999, p.5) further added that *'rural aquaculture contributes to the alleviation of poverty directly through small scale farming of aquatic organisms for domestic consumptions and/or income; or indirectly through employment of the poor as service providers to aquaculture or as workers on aquatic farms of wealthier farms; or indirectly by providing low cost fish for poor rural and urban communities'*.

In recent years Bangladesh has made considerable improvements in fish culture technology, in particular in pond-based system (ICLARM, 1998). Sen *et al.*, (1997, p.99) cited that *'the potential for aquaculture to contribute to poverty alleviation is good, provided the extension message and the technology is appropriate for rural poor, and the extension service makes an effort to reach the target group'*. Edwards (1999) specified that *'pond culture has the greatest potential and is likely to have a correspondingly greater overall impact on poverty alleviation'*.

If the dynamics of poverty are analysed from a “capitals” perspective, there are three mechanisms by which aquaculture can impact upon poverty: by increasing production, creating opportunities for employment and by increasing consumption (Cox *et al.*, 1998).

Table 2.1 sets out the primary features of aquaculture for poverty impacts.

**Table 2.1: Primary features of aquaculture for poverty impact (Muir, 1999)**

Positive opportunities	Potential constraints
<ul style="list-style-type: none"><li>• use otherwise underused resources</li><li>• potential access for landless poor</li><li>• possible options for artisanal fishing groups</li><li>• opportunities for home food supply and inputs to local markets</li><li>• involvement of women and children</li><li>• may encourage better water management, with other benefits</li><li>• range of secondary opportunities</li></ul>	<ul style="list-style-type: none"><li>• may give rise to resource access conflicts</li><li>• possible market limitations- seasonal gluts/high prices in other circumstances</li><li>• wealth creation dynamics may disadvantage poorest sectors</li><li>• may depend on expensive seed, feed inputs</li><li>• technical skills may be too complex</li><li>• may add to production risks</li><li>• may increase exploitation of vulnerable groups</li></ul>

A theoretical framework of the contributions of aquaculture to the sustainable livelihoods of the rural poor as suggested by Edwards (1999) is presented in Box: 2.1.

**Box: 2.1 Contribution of aquaculture to sustainable rural livelihoods**

Aquaculture contributes towards sustainable rural livelihoods of the poor in diverse ways:

- high nutritional value food, especially for vulnerable groups such as pregnant and lactating women and pre school children
- employment through farming, including women and children, and seed distribution networks
- income through sale of relatively high value produce
- benefit from common property resources, particularly the landless, through cage culture and enhance fisheries in otherwise under-utilised resources
- rice/fish culture as a component of integrated pest management
- increased farm sustainability through construction of ponds which also serves as small scale, on farm reservoirs
- increased availability of low cost fish in local markets

In enhancing contribution of the aquatic resources to rural livelihoods Townsley (1998, p.148) stated that *‘the introduction of appropriate culture techniques can significantly enhance the contribution of aquatic resources to rural livelihoods. However, this will only be appropriate where the followings are available; secure tenure for key resources of water and / or land; appropriate technologies and adequate technical support and input supply’*.

From the theoretical review of current developments in aquaculture, it is clearly revealed that aquaculture in Bangladesh has enormous potential due to richness in natural, physical and human capitals. Edwards (1999, p.36) suggested that *'poor farming households need to be provided with the most basic extension information for their contexts (cultural and resource profiles) if they are to be assisted'*.

So far external interventions, in most cases, have not been demand driven and have rarely targeted poor people. In particular, the impact of aquaculture interventions is yet to be examined critically and had been raised as a demand by many development specialists.

In the recent past, extension was considered to be an essential part of the technology transfer system. A number of factors such as technical, socio-economic and environmental are limiting the concomitant development of aquaculture in Bangladesh (Gupta *et al.*, 1994; Worby, 1994). Aquaculture will have to be considered in a holistic viewpoint such as social, economic and environmental context (Edwards, 1999). People speak of the value of social development in extension programmes (Sen, 1990; Garforth, 1993; Carney, 1998). However, the degree to which extension actually empowers people and thereby affects their livelihoods is yet to be examined in any depth.

The potential role of nutrition has often been discussed in a positive light. A number of small-scale case studies have been carried out and documented. But the actual contribution of aquaculture to poverty reduction in any depth has yet to be established (Edwards, 1999; Edwards *et al.*, 1999; Muir, 1999; FAO, 1999). Demaine *et al.*, (1996, p.19) pointed out that *'the potential roles of aquaculture in general, and small scale aquaculture in particular, needs to be assessed for their contributions to sustainable development'*.

Now I will attempt to pull all the threads together which have been illuminated in the previous sections on development; development intervention; aquaculture, social

development and poverty to establish some sense and look holistically to find out what exactly all these things mean and what are their implications in development interventions.

Up until now, a number of fisheries extension approaches have been tried. But the efficacy of all the methods has yet to be reviewed and evaluated carefully. A group of development specialists whilst drafting recommendations from workshop proceedings for the improvement of the fisheries sector have honestly mentioned that in the *'fisheries sector multiple extension approaches are used but they need evaluation'* (NAEP, 1996). A number of technical, socio-economic and environmental factors are limiting the concomitant development of aquaculture in Bangladesh (Gupta *et al.*, 1994; Worby, 1994).

To improve effectiveness of extension services Rogers (1993, p.14) called for a shift in extension which he named the “third generation extension”, *‘ which seeks not to transfer technology nor even to learn from farmers but to strengthen peoples existing capacity to create knowledge-to question, to analyse, to test possible solutions for themselves’*.

The “Learning process approach” is a recent shift in extension education. The essence is to learn from farmers and engagement in learning by both the provider and recipients (Korten, 1980; Chambers, 1983). This approach further stresses education that empowers people; builds knowledge and capacities (Van Beek, 1997). This represents a movement forward from building human capital that is purely technical knowledge and skills, towards other human capital of self-esteem, leadership skills, and communication skills that can be used to generate social capital. Therefore, it helps to strengthen people’s own ability to choose the best options (Korten, 1980; Chambers, 1983; Garforth, 1993; Hagman *et al.*, 1996; NAEP; 1996) and to transform the skills achieved to their livelihood (Sen, 1990).

Moreover, the “learning process approach” to development helps in achieving long term sustainable development rather than inappropriate and unsustainable quick-fix solutions (Korten, 1980).

Therefore, extension approaches are being challenged, not in regard to increasing farm productivity *per se*, but in the degree to which they are able to influence the livelihoods of resource poor people (Koppel, 1995; Ali and Srivardana, 1996; Haylor, 1998). Edwards (1999, p.21) also stated that '*social and economic issues are more determinants of more wide spread involvement of the poor in aquaculture rather than availability of appropriate technologies, and thus warrant emphasis*'.

This suggests that extension needs to foster aspects of participation and empowerment, which lead to equitable sharing of benefits and eventually a reduction in poverty. Indeed, the extent to which Extension empowers people and thereby impacts upon their livelihoods needs to be examined in greater depth (Koppel, 1985; Sen, 1990; Garforth, 1993; Carney, 1998).

## **2.8 Poverty focused Sustainable Aquaculture Development: an Alternative Approach**

### **2.8.1 The Proposed Model**

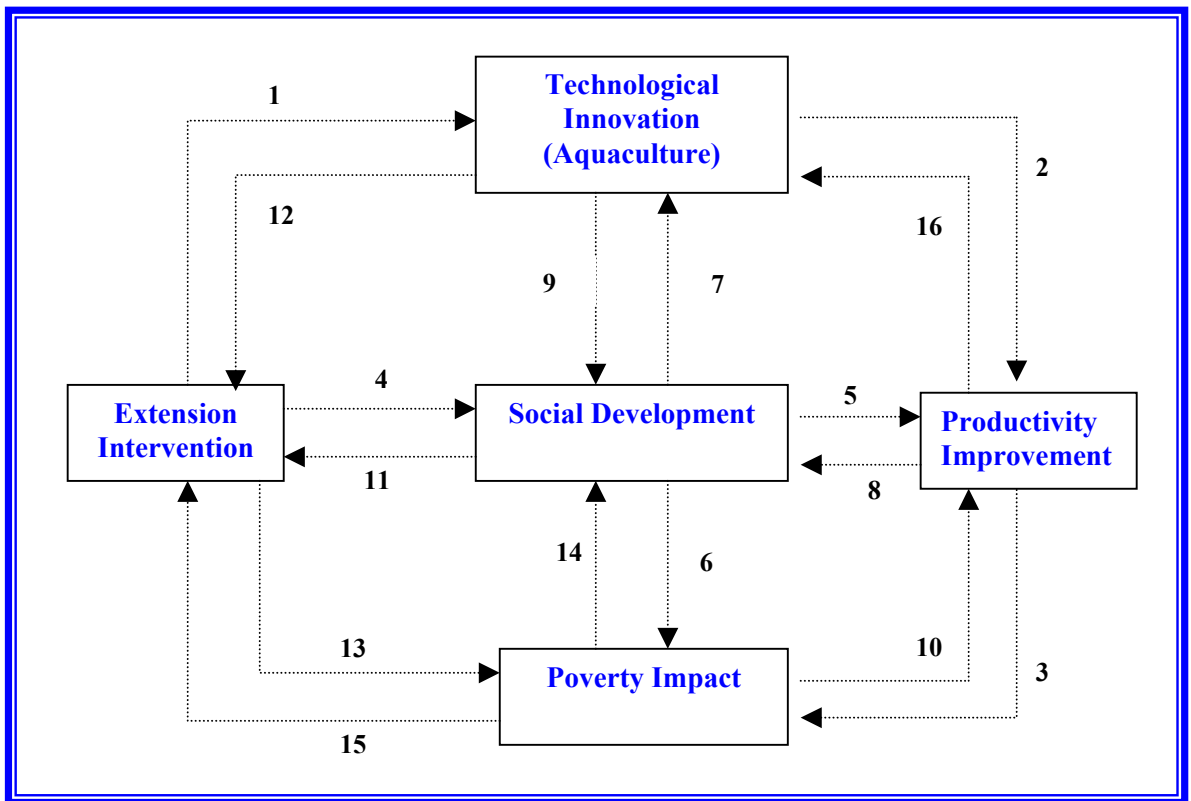
Current deficiencies of Extension in Bangladesh have been reviewed (Section 2.4). Developments in current thoughts on development interventions (Section 2.5), Social capital (Section 2.6) and poverty reduction have been discussed. The role of aquaculture in poverty reduction has been examined (Section 2.7). Now, an attempt will be made in the following section to critically examine the pathways of effect between extension intervention, social development and poverty to eventually build a model that helps us to discriminate between extension approaches (See Fig: 2.4).

The model has five boxes, extension intervention; technological innovation (for example aquaculture); productivity improvement; social development and poverty impact. The numbered arrows indicate possible causal links between the various aspects which are illustrated as follows:

[1] Technology transfer from experts

[2] The successful application of technology

[3] The Poor share in improved productivity (directly through their own production or at 2<sup>nd</sup> hand through employment opportunities)



**Figure 2.4: A Model of the Linkages in Development Aspects and Poverty Impact**

[4] Interventions foster groups, networks and opportunities for building social capital

[5] Reduction in conflicts over resources, more efficient resource utilisation

[6] Social inclusion leads to gifts, knowledge sharing, enhanced self-esteem, collective resources targeted at the needs of the poor

[7] Social cohesion leads to lesson learning and sharing

[8] Increased resources lead to opportunities to build social capital

[9] The technology only works through groups of producers, so groups must be established

[10] Poverty reduction generates more resources for production

[11] A more cohesive society is able to demand extension services/external intervention

[12] Indigenous knowledge taken up by the extension service, disseminated and/or improved

- [13] Targeting of services to the poorest (credit, inputs, subsidies),
- [14] Declining poverty leads to more social cohesion
- [15] Evaluation of impact determines development of subsequent extension intervention
- [16] Increased productivity is invested in experimentation by producers

Thus aquaculture innovation increases productivity but in its own right does not affect poverty. Gupta & Shah (1994, p.188) mentioned that *'the development of commercial aquaculture or high-input, high-output aquaculture could increase national production, but will not benefit the rural resource poor farmers who do not have the purchasing power'*.

External intervention can increase the technical ability of people and productivity (Thompson *et al.*, 2000) but without a social perspective it is the better off who benefit (Lewis, 1997; Worby, 1995; Haylor, 1998) (*links 1&2, but not link 3*).

On the other hand, more participatory methods improve transfer (Osborn, 1996; Garforth, 1999; Demaine, 1999; Edwards, 1999; Nath, 2000). Actions that promote Social Development (*link 4*) can increase people's self-esteem and enhance co-learning and eventually assist in building social capital (*links 4 and 7*). The overall development of a community is dependent upon the stocks of physical and social capital of a community (Collier, 1998; Simpson, 1998; Krishna & Uphoff, 1999; Narayan, 1999; Dhesi, 2000). The ability to cope in a crisis for a community is also dependent upon social capital (Dhesi, 2000). Social capital can generate economic (Krishna & Uphoff, 1999; Coleman, 1988; Simpson, 1998; Narayan, 1999) and non-economic benefits (*link 6*) (Dhesi, 2000) and eventually improves the well-being of all. Simpson (1998, p.107) opined that *'viable technological alternatives/ improvements, and supportive local social processes are highly complementary. Both can be said to be essential, mutually reinforcing ingredients of successful rural development'*. Aquaculture can be a means for developing social capital in a community. Impacts of interventions can be seen at various levels among various groups and can be differentiated between extension approaches (*link 9*).

When discussing sustainable community development, Hope (1996, p.200) stated that *'it can be looked at from a variety of perspectives: environmental, economic, social, political, cultural or technological, for example. However, none of these perspectives can stand-alone and sustainable community development is therefore only possible if they are all taken into consideration'*. Allison & Ellis (2001, p.387) suggested *'the key to sustainable fisheries management and development is to facilitate small scale fisher folk to find their own routes out of poverty by building on their existing capital and capabilities'* (link 7).

Thus, an extension approach for aquaculture technology transfer (link 1) may only bring benefit benefits to the rich. Extension approaches that enhance social development through technology developments (links 4 and 1) have the potential to impact upon aquaculture and poverty as well, directly and indirectly (link 3).

Reflecting upon the above discussion, it can be argued that any extension intervention to discharge sustainable impacts on rural people's livelihoods needs to be crafted to incorporate various elements of social development, but aquaculture might be the entry point. The following assumptions can be made:

- Aquaculture can impact upon poverty and social development (links 2+10 and 9)
- Extension can impact upon aquaculture, social development and poverty (links 1, 4 and 2+10 & 6)
- Social development can impact upon aquaculture and on poverty (links 7 & 6)

So the dimensions of aquaculture; development interventions; social development and poverty require systematic evaluation. From these considerations the research questions have been developed. These linkages and relationships will be tested with the findings in Chapter 7.



## 2.9 Research Questions

The objective of the research is to contribute to the current debate about the role of interventions in generating sustainable livelihoods by examining the contention that *‘Aquaculture Extension Approaches that fail to substantially address social development will lead to no more than a superficial reduction of poverty’*. The proposed study will dissect and analyse the effects of different extension approaches as they affect technology, productivity, social development and poverty. Therefore it is essential at this point to formulate careful and well thought out research questions to frame the investigation of the above issues. The following questions emerged:

- To what extent does the extension approach influence aquacultural productivity?
- What is the extension method like?
- To what extent does the extension approach influence the elements of social development?
- In what ways and to what extent does the extension approach affect poverty?

It is hoped that the findings of this investigation may provide insights and guidelines for developing aquaculture extension approaches targeting resource poor farmers in the future in Bangladesh.

## CHAPTER 3: RESEARCH METHODOLOGY

### 3.1 Introduction

As stated in Chapter 2, the sphere of the research is multi-faceted, requiring information on topics such as aquaculture improvement, social development, extension intervention, and poverty. The research questions for this investigation covering four issues have been set out in Chapter 2. A checklist of information needed for this study was prepared including respondents and methods for data collection. The checklist was prepared in four sections and further segmented so that important aspects were not missed out. These include aquaculture (physical conditions of ponds, stocking, use of inputs, production, consumption and marketing pattern); extension methodology (aims and objectives; variety of information; targeting; training arrangements; input supply mechanism; use of extension methods, materials; monitoring, evaluation; provision of adaptive research and cost-effectiveness); social development (social structures; interpersonal behaviour, groups and social capital) and poverty (physiological needs: food & water; security needs: housing, sanitation, health; affiliations needs: memberships, representations, and participation; self-esteem needs: education and training, decision making; self actualisations: mobility, recreation, cultural pursuits).

These were prepared taking into account the literature and similar socio-economic impact studies by reference to Ahmed (1992), Ahmed *et al.* (1993) and Thompson *et al.* (2000); PAPASL users guide, 1997); DFID (1998) livelihoods guidance sheets; CARE livelihoods guidance sheets. Thus the design and the overall methodology of the research was analysed and refined carefully in order to successfully achieve the objectives of the study.

## 3.2 Research Approach

### 3.2.1 Rationale

It was fundamental to collect data on aquaculture management, on extension interventions, and impacts of interventions on social aspects of the community with particular emphasis on poverty. The study required thorough investigation on contemporary phenomena about the possible impacts of extension intervention focusing on aquaculture on the overall livelihood strategies of the community people within some real context.

The dimension and scope of the research led to a case study methodology being chosen. The use of case study research methods has been widely used in a variety of disciplines, including natural sciences. A case study is an entity, which is studied as a single unit and has clear boundaries; it is an investigation of an organisation, an event, a process or a programme (Merriam, 1988; Bassey, 1999).

Many researchers have described the usage and advantage of case study as a research methodology. Adelman *et al.*, (1997, p.140) described '*case study as an umbrella term for a family of research methods having in common the decision to focus an enquiry around an instance*'. Yin (1984, p.23) defined case study as an empirical inquiry that '*investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources are used*'.

Anderson (1998, p.152) opined that '*case study is a holistic research method that uses multiple sources of evidence to analyse or evaluate a specific phenomenon or instance*'. He further added that '*case studies are a useful way to systematically look at a specific case, collect data, analyse and interpret findings within their context and report results*'.

Case studies also offer opportunities to concentrate on specific instances to allow in-depth study and illustrate relationships of events (Yin, 1984; Bell, 1993; Robson, 1993; Blaxter, *et al.*; 1996; Birley *et al.*, 1998). Denscombe (1998, p.32) opined that *'case studies focus on one instance (or a few instances) of a particular phenomenon with a view to providing an in-depth account of events, relationships, experiences or processes occurring in that particular instance'*.

The investigation had to be conducted in communities in a natural setting. People and people's livelihoods and their mode of social interactions are the key focus since the research intended to assess livelihood impacts of past interventions in circumstances that are inevitably uncontrollable. Woods (1999, p.4) stated that *'social life is ongoing, developing, fluctuating. It never arrives or ends. Some forms of behaviour may be fairly stable, others variable, others emergent'*.

To establish working explanations, the cause and effect relationships of aquaculture; extension intervention; social development and poverty, outlined in section 2.8, had to be explored. The ability of case study research to tackle such complexities has been recognised by many researchers and was thought to be essential to cope with the multi-facet dimension of the current study. As Yin (1984) wrote, Case Study:

- ❑ *can explain the casual links in real life interventions;*
- ❑ *can describe the real life context in which an intervention has occurred;*
- ❑ *can evaluate and finally*
- ❑ *can explore those situations in which the interventions being evaluated has no clear, single set of outcomes'.*

Case studies as a research approach have the ability to offer such opportunities, as Bassey (1999) in his critical review of case study research suggested that case study has the ability to understand the complexity of a particular context. Similar comments have also been

made by Cohen *et al.*, (2000, p. 181) who mentioned that '*Case studies can establish cause and effect, indeed one of their strengths is that they observe effects in real contexts, recognising that context is a powerful determinant of both cause and effect*'. In mentioning case study, Simons (1996, p. 225) opined that '*it explores the paradox that is at the heart of case study and argues that by focussing in depth and from a holistic perspective, a case study can generate both unique and universal understandings*'.

The use of multiple case studies has been reported to be advantageous (Yin, 1984; Stake, 1994). Miles & Huberman (1994) cited that multiple case studies could pin point specific situations and also shed light on how certain conditions may be related. Again, Yin (1984, p.48) opined that '*the evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust*'.

Individual case reports were to be written up using a common format (Miles & Huberman, 1994). This would eventually assist in data analysis and presentation of results. Gosling *et al.*, (1995, p 93) cited that '*case studies can be used to examine the impact of a programme on particular households*'. This in turn would be reflected through patterns, trends, dissimilarities and unusual events emerging for various indicators, and criteria; as qualitative research seeks to identify patterns and processes, commonalities and differences (Miles & Huberman, 1994). Cross case summaries as explanations will then be written by highlighting the key essences of each indicator. Each case will be ordered/ranked (Miles and Huberman, 1994)) on the basis of the differences that determined the rank position for each. This will assist in making comparisons across cases (Miles & Huberman, 1994).

Qualitative research can also be used to generate theory from data (Woods, 1999). Case studies are immensely useful in building and testing theory (Yin, 1994). In the current study attempts will be made to generate "comparative explanations" that Yin (1984)

suggested are rival explanations, and then to look for consistent patterns from where some explanatory significance can be drawn from a specified set of comparisons (Mason, 1996).

Findings derived from the study will help to refine the theoretical propositions made in the model and contribute to developing a working hypothesis for testing.

### **3.3 Study Population**

In case study research it is fundamental to define a ‘case’ before investigation. Atkinson *et al.*, (1985, p. 29) mentioned that *‘the case need not to be a person or enterprise. It can be whatever ‘bounded system’ that is of interest. An institution, a program, a responsibility, a collection or a population can be a case’*. In this investigation a case represents an aquaculture intervention launched in the recent past at a particular community (a village, in rural Bangladesh).

In relation to figure 2.4, five different approaches to extension, which are being used in the Northwest of Bangladesh, including a control, were selected as the cases for the study (see Table 3.1) each of which has individual identity and eventually might have predictable impacts. They were:

**CASE 1:** Non-contact control: Where there has been no fisheries intervention.

**CASE 2:** Trickle down approach of extension: In this approach to extension only technical support has been provided by the extension agency to the ‘Result Demonstrators’, an innovative fish farmer, and a group of ‘Fellow Farmers’, a few neighbouring farmers around the RD farmer in a community. It is also expected that these contact farmers will implement the technology provided by the extension agency and eventually there will be a trickle down effect to the neighbouring fish farming community. The programme is supposed to provide extensive training and follow-up support to RD’s to develop as community

extension agents. No direct inputs are provided to the fish farmer. (See section 2.3.1).

**CASE 3:** NFEP Demonstration programme: Individual poor farmers have been targeted to promote a definite technical package. There has also been provision of refundable credits and/or inputs. It was also expected that the demonstration technology would be disseminated to the neighbouring farmers. Hands-on practical training, and follow- up visits were provided to develop skills. The demonstration farmer is developed as a future extension agent for that locality by encouraging them to pass on their skills and by being held up as examples. (See section 2.3.2).

**CASE 4:** Model aquaculture village programme: This is a community-based approach to extension discharging extension benefits on an equitable basis. In this approach farmers are encouraged to identify possibilities and potentials of their own resources and to act according to their capacity. The extension agent merely plays the role of a facilitator. There are no direct provision of inputs, only training is provided to the farming community. Attempts have been made to introduce elements of enterprise integration into this programme to increase the efficiency of resource use. (See section 2.3.3).

**CASE 5:** NGO extension approach: This is a comprehensive approach to community development designed on the assumption that, with a more integrated approach supported with credit provision, there will have a more positive effect on the livelihoods of targeted participants. The main focus has been to involve people from poorer sections of the community and to encourage participation and empowerment of the disadvantaged. The chosen NGO is the Rangpur-Dinajpur Rural Service, a large national non-governmental organisation. (See section 2.3.6).

**Table 3.1: Cases Described in terms of the links from the Model**

Case	Approach	Objective
Case 1: Control		
Case 2: Trickle Down	Links 1+2+some 4	To possibly achieve Link 3 (indirect benefits)
Case 3: Demo Farmer	Links 1+2+3 and some 6	To possibly achieve Link 3 (direct benefits)
Case 4: Model Village	Links 1+2+4+6+7	To achieve Links 3+5+10+11+12+14+16
Case 5: NGO	Links 1+2+4+6+13	To achieve Links 3+10+11+14

The study was conducted in two phases. In Phase 1 each individual case under investigation was studied in a natural setting using a variety of methods. The data collected would be analysed and individual reports written up. A cross case analysis, following pattern-matching techniques, would be undertaken and working explanations developed. In Phase 2 a similar set of representative communities were selected. The working explanation developed in Phase 1 would be matched with the outcome of the Phase 2 study. The overall matching of patterns, across cases, would enable a comparison of their differences to be made that would eventually lead to the acceptance, rejection or modification of the explanation. The detail of the selection of communities has been set out in Section 3.4.1.

### 3.4 Sampling procedure

Within the research context there are levels of complexity between the level of data collection and the level of case, briefly outlined below:

#### Level I

The 5 Cases each made up of different approaches and interventions

#### Level II

Villages, representing the cases, each having different population sizes, geographical locations, infrastructure, economic achievement and livelihood patterns.



### **Level III**

Within each village, many different social groupings, ethnic groups, income groups, gender grouping, cultural groups.

### **Level IV**

Within each group, a number of different individuals in respect of education, age, experience, status and family memberships.

To manage this complexity of variation, village selection (level II) took place according to criteria identified in **Sections 3.4.1 - 3.4.5**. A multi-stage stratified sampling technique was employed. Moreover, the data collection involved stratification of respondents (levels III) such as rich, medium and poor. At level IV, respondents were selected on the basis of purposive sampling techniques in respect of education and experience, age, status, family membership. These steps ensured the final comparability of cases, as a result of decreasing sampling variability, through the representativeness of each stratum, which thereby ensured the reliability of data that inevitably had to be gathered at level IV (FAO/SIDA, 1989; Henry 1990).

A detailed description of the sampling procedures employed in this investigation are presented below:

#### **3.4.1 Level II: Selection of Study villages**

Sampling and selection is the most important strategic elements of qualitative research (Mason, 1996). The importance of selection of case villages was fully recognised and attempts has been made to select villages as a representative one.

There were 58 Upazilla's involved where the different interventions were in operation. The researcher travelled to over 150 villages in 25 Upazila's where extension programmes were implemented. Finally 10 villages were selected which were representative of the four cases and a non-contact control, where there has been no fisheries intervention.

Study villages were selected using information from secondary sources such as NFEP and RDRS record archives. Extensive consultation was made with local DoF, NGO officials and NFEP Extension Officers based at each district. In addition, personal long-term experience of the researcher being born in the study area, directly involved and working with in NFEP command area for about 10 years was also utilised. A check list including the following criteria were employed in selecting study villages and are as follows:

**Accessibility:** This is a very important issue for any research. Before launching any research one must gain access to all sorts of information needed for the study (Mason, 1996; Bell, 1999; Anderson, 1998). This means that each case needs to afford the same degree of accessibility as every other.

**Distance from the population centre:** Location of villages is an important aspect to consider. This potentially has great influence for any development interventions. Villages selected under this investigation were located within 15 km from a population centre (Mason, 1996).

**Non-polluted intervention/Unique intervention:** This is a very important criterion when studying cases. For case study research it is important that one should select a typical instance of 'the case' where the determining variables are the case criteria, and there has been no overlap by inclusion of criteria from other cases (Henry, 1990; Denscombe, 1998). Communities were selected on this principle (Denscombe, 1998)

**Attitude of the Extension Agent:** Since the motivation, interest and enthusiasm of the extension agents can significantly contribute to the successful implementation and the overall sustained impact of any programme, it was necessary to take the character of the extension officer responsible for that village into account. Villages where the Extension officer showed excellent or very poor performance were avoided. This assessment was

made by verbal consultation with the local DoF/NFEP and NGO officials. The experience of the researcher was also useful in locating cases having similar attributes and quality of service delivered to the community by the providers.

**Maturity of the programme:** To study impact it is important that the interventions under investigation were implemented in the same years. All the cases were implemented concurrently with the exception being the NGO case, where support is still continuing.

**Number of households per village:** Since data collection involves the use of a variety of PRA tools and the number of household for a manageable PRA programme is around 100 (Narayanasamy *et al.*, 1993; Mukherjee, 1996; Sarch, 1996), communities with between 100-120 households were chosen.

**Agro-ecological region:** Since this study involves study of aquaculture production it is important that these cases based at similar agro-ecological regions. (Mason, 1996; Gupta *et al.*, 1999).

**Number of ponds in the village:** The study required detailed assessment of the impacts of aquaculture benefits and more holistic relationships within livelihood systems. To sketch a detailed picture of the above aspects a limited range of ponds would be helpful. The range of ponds in the study villages considered was set between 20 and 30.

**Flood & drought proneness:** This can have significant influence upon overall fish production and also eventually can be seen as a constraint for aquaculture development and eventually a case of extremity. Communities under investigation were selected which were free from flooding and drought under normal years.

Having elucidated the above criteria for community selection, over one hundred and fifty villages in twenty-five Upazillas were visited in order to have ten communities with which to work. It is important to mention that, above all, finding a non-polluted representative case was given as the highest priority and foremost criteria for selection.

### **3.4.2 Level III: Socio-economic grouping: Wealth Ranking of study communities**

Since this investigation included aspects of poverty it was necessary that a diagnostic study starts with a disaggregated analysis of the asset base and livelihood systems of different socio-economic strata, and from that develop household typology, since different socio-economic categories may have different livelihood strategies (DFID livelihood guidance sheet, 1998; Farrington 1999; Mikkelsen, 1995; FAO, 2000)

The following procedures were adapted (Guijt, 1991) to carry out the whole exercise:

#### **Step I: Things done before the exercise**

- ❑ Obtain and written down the names of all households and give a code number to each household
- ❑ Names of each household were written down on cards
- ❑ 3 informants who knows the community and willing to take part in the exercise were selected
- ❑ Arrival dates, timing informed well ahead of the exercise
- ❑ A quiet and suitable venue was selected in consultation with the informants

#### **During the exercise**

- ❑ The objectives of the exercise were explained to respondents
- ❑ The informants in agreement was asked to put cards in to piles each of which belong to different wealth groups and this was done for all households
- ❑ At the end each pile occupied by households were read out and the piles made by the respondent were reviewed thoroughly if the ranking is reasonable
- ❑ Write down the respondent number by pile on each card on the back of cards

## Step II: Group ranking and perceptions of criteria for wealth ranking.

Since this project intended to look at impacts of intervention on different wealth groups in the community it was crucial that the ranking was done properly. It was decided that on the basis of the 1<sup>st</sup> wealth ranking exercise, a second ranking exercise would be done with key informants from the same locality. This was accomplished to firstly, validate (cross-checking) the initial ranking (Mukherjee, 1996) and secondly, to get a wider and more refined view of the criteria for well being laid out for each category of ranking by them against each village. And thirdly, to homogenise ranking to make the same number of categories for all the villages to compare and assess impacts. Women were also included so that their perceptions of well-being would not be omitted. The process and techniques adopted to set out criteria for well-being in this study were in line with those presented by Mukherjee (1996).

Even though wealth ranking by card sorting has been used widely throughout the world it has limitations too. As perceived we found slight variation of ranking done by individual respondents during cross checking by groups of people and were corrected accordingly before and or during the data collection.

At level III, in Phase 1, pond-owning respondents were stratified on the basis of wealth category such as Wealth Group I, II, III and IV (where I is high wealth and IV is highest poverty). Samples within each level III grouping, wherever necessary, were randomly selected. It is important to note that in Phase 1, in the case of Wealth Group II, there were less than 5 respondents so that it was not possible to form a group made up of such a small sample size. So Wealth Group II was finally merged with Wealth Group I. In Phase 2, respondents were categorised into Wealth Groups I, II and III from the outset.

### 3.4.4 Level IV: Stratified sampling

At level IV data was gathered from individual respondents in respect of education, qualifications, age, experience and family membership to collect perceptions on livelihoods options and strategies involved to secure livelihoods (Henry, 1990; DFID, 1998; FAO, 2000).

Females were also chosen since they might have a role in aquaculture and also in other household activities, which eventually might influence the overall livelihood strategy of the community members. In addition, extension providers, extension policy makers involved in the implementation of each intervention were included under investigation. Local leaders as instant monitors of changes within each community were also considered for study. In addition, fry traders involved in supplying fish seed and who act as informal extension agent as important partners of the aquaculture management system were considered as important respondents.

**Table 3.2: Distribution of respondents for all 5 cases involved in this study**

Serial No	Type of Respondents	Number of Respondents		Data Collected
		Phase 1	Phase 2	
1	Pond owner	141	129	Household socio-economic survey
2	Pond owner	50	50	Community Social Capital survey
3	Pond owner (Male)	90	90	PRA/Focus Group discussion
4	Pond owner (Female)	89	90	Ditto
5	Pond owner (extension recipients)	18	-	For extension methodology survey
6	Extension providers	12	12	Ditto
7	Key informants	8	-	Extension Managers
8	Key informants	10	10	Community members

### **Purposive sampling: Selection of Key Informants**

The key informants, the knowledgeable individuals who are thought to be the most useful source of data for this particular study, were selected following a purposive sampling technique. Denscombe (1998) suggested that researcher should engage this technique deliberately because they can produce most valuable data.

The District Fisheries Officers have a central role in implementation of all the extension activities in their district. They also report progress of programmes to the projects.

The Director (Economic and Environmental services) and Co-ordinator (Fish) of RDRS have crucial roles to play in policy making and crafting aquaculture development programme in the organisation.

The Project Director and the DFID Technical Co-operation Officer (TCO) Team leader (NFEP) are the key players involved in designing and development of all extension programmes associated with NFEP-2. They also carefully monitor and review each programme annually. Because of their key role they were chosen as Key informants.

A few of the community members were also considered as key informants to get their opinions and ideas about aquaculture development and other community issues as a whole.

### **3.5 Methods of Data Collection**

The data collection method generally varies with the nature of the investigation to be made. Normally, case studies involve a mixture of methods (Yin, 1984; Robson, 1993; Blaxter *et al.*, 1996; Denscombe, 1998). A combination of methods such as participatory methods and small-scale survey could yield cost effective data on the determinants of rural livelihoods (Ellis, 1998). One, major strength of case study research is the use of multiple sources of evidence to maximise the findings (Yin, 1984; Blaxter *et al.*, 1996; Anderson 1998;

Denscombe, 1998; Bassey, 1999). Anderson (1998, p.159) further cited that *'findings based on conclusions suggested by different data sources are far stronger than those suggested by one alone'*. The following Table 3.3 indicates in broad terms the type and order of data to be collected for this investigation.

**Table 3.3: Type and Order of Data**

Serial No.	Type of data	Aspects
1	Quantitative Figures (Fact)	No of families; Female headed households; Population, children; No of ponds; Size of ponds; Credit recipients, Education and Training recipients, Housing; Latrine and Drinking water access;
2	Quantitative (Opinion)	Fish catch; use of inputs; Fish consumption; Social capital
3	Qualitative (Opinion)	Community status on health; education; Community support by GO and NGO; Community solidarity and overall community development issues. General comments on extension interventions.

Therefore, a large variety of tools were employed for data collection in this investigation as follows:

### **3.5.1 Questionnaire Survey**

Questionnaires have been commonly used and are good tools for data collection in case study research (Bassey, 1999; Cohen *et al.*, 2000). Youngman (1982) considered questionnaires as an extremely rapid and confidential method of data collection.

Ellis (1998) and DFID (2000) suggested using questionnaire surveys in obtaining data on livelihoods strategies and emphasised that questionnaires yield reliable data on the above issues. Data was gathered on the basis of wealth categories and was possible to compare across cases and across wealth groups. The detail gathering of data from the community members through questionnaires is described in **Section 3.8**.



Questionnaires provided very useful information, in particular, opinions and perceptions of both extension providers and recipients was gathered for each intervention to cross validate data collected on similar topic both two different perspectives.

In selecting respondents for the questionnaire survey on extension methodology (**Appendix 2**) three categories were identified. Firstly, the TFO's and Assistant Fisheries Officers (AFOs) have wide and long experience, working for at least 10 years in the northwest region. These people are the drivers of extension programmes at the Upazilla level. They participate in and observe the whole process of extension activities. Secondly, the NFEP Extension Officers were also selected, since they have a co-ordinating role in implementing all NFEP programmes. Moreover, they are often directly involved in community discussion, meeting and training. Thirdly, in case of the NGO, the Extension Officer (Fish) and Senior Trainer (Fish) were chosen as study sample since they were directly involved in training and extension with the beneficiaries.

Questionnaires have been used to gather data on existing social capital, to assess trust, solidarity and community collective action, from the community members (Appendix 7). Since they yield good data on people's perception and opinions on certain issues on a Likert scale this provides opportunities for simple and effective analysis (Blaxter *et al.*, 1996). The details of data gathering are described in **section 3.8.4**.

### **3.5.2 Direct Observation**

Participatory Assessment of Poverty and Sustainable Livelihood users guide (PAPSL, 1997) stated that direct observation is '*systematically observing objects, events, processes, relationships or people and recording these observations*'. The use of direct observation in case study research has been emphasised (Yin, 1984; Crossley *et al.*, 1984; Atkinson *et al.*, 1985; Robson, 1993). Observations in this study were made to capture pond management practices and to enrich data collected by other methods (Simpson *et al.*, 1995). Bowling

(1997) also added that systematic observation is a classic method of enquiry in natural science (people's experimentation, knowledge and values). The value of observation as a data collection method has been emphasised by Simpson *et al.*, (1995, p.17) who opined that *'there is almost no research strategy to which data collection by observation cannot contribute'*.

The importance of observation in this research has been of great importance. Observation on physical conditions (**Appendix 4**) of ponds can yield data on pond management practices which can be cross checked with other data relating to pond management and a conclusive comment can be drawn. The actual data collection through observation methods is described in **Section 3.8**

### **3.5.3 Focus Group Discussion**

The use of focus group interviews in qualitative as well as in case study research has been emphasised by a number of researchers. Holloway (1998) suggested that a focus group is a group of people with common experience and can be used to elicit ideas, perceptions about a specific topic or an area of interest.

Focus groups are important sources of data in case study research (Yin, 1984; Robson, 1993). It has been used to yield data on attitudes, perceptions on aquaculture status; social and other community development issues and their inter-relationships with aquaculture, community development (Richards, 1994). In addition it can yield data for explaining the reasons why they are operating their livelihoods in such a way (Kitzinger, 1995). Again, Anderson (1998, p.200) opined that *'focus groups elicit unique types of in-depth qualitative data which could not be obtained as efficiently by any other way'*.

Data was collected through focus groups on issues, such as, aquaculture status, community, social, economic and involvement in institutional aspects on the basis of wealth groups.

Focus group sessions were also coupled with other participatory exercise. Data collection through focus groups interviewing has been the most useful experience throughout the data collection period. This was firstly due to the fact that this was a guided discussion and respondents speak in house and in their own style. And secondly, but most importantly, these focus group discussions were coupled with some visual presentation and that actually was rewarding both for the respondents and the researcher as well. The PRA tools use for data collection are mentioned in the following section and the actual data gathering by focus group's discussion is illustrated in **Section 3.8.8**

### **Participatory Rural Appraisal (PRA) Tools**

The use of PRA tools in gathering information to learn about rural communities on the ground from community members has been advocated with great emphasis (Chambers, 1992, 1997; Leurs, 1995; Sarch, 1996; Mikkelsen, 1995; Holland & Blackburn, 1998). PRA has been described by IDS (1998, p.1) as '*a growing family of approaches and methods to enable rural people to share, enhance and analyse their knowledge of life and conditions, to plan and to act*'.

Holland & Blackburn (1998) noted that PRA focuses upon existing socio-economic and socio-cultural issues. They also added that PRA could be used to assess social impact. Chambers (1998, p. xvi) indicated that PRA can be used '*to learn more and more accurately about the realities of poor*'. Mikkelsen (1995, p.70) referred to PRA as '*data economizing and data optimising approaches*'. PRA provides opportunities to collect information on various livelihoods issues in a short time from community members in a relaxed mood at the community and probably, more importantly, in their own way. And using PRA as a research method, much can be seen physically during discussion that explains and expands on the verbal information. In addition, PRA provides chances to cross-validated information provided by respondents, a kind of on the spot triangulation.

Through PRA one can get to the heart of the community and sense how the heart is running and thus data are more in-tune and in-depth.

In this study, PRA was used as an extractive method of collecting data rather than a participatory development process. The following PRA tools were employed for data collection. The actual data gathering is explained in **Section 3.8**.

#### **Wealth Ranking (see section 3.4.3)**

Wealth ranking has been widely used for socio-economic grouping for targeting poverty-focused development. Wealth ranking methods has been used to know relative wealth of a specific area (Sarch, 1996). Sarch (1996) further suggested that this is particularly advantageous in identifying informants from different socio-economic groups and also to study impacts of interventions on different socio-economic groups. In Phase1, communities were classified in to Group I & II, III and Group IV to look at impacts of interventions on different wealth groups of people. In Phase 2, the communities were grouped into Groups I, II and III groups.

#### **Matrix Scoring**

In this investigation, a decision-making matrix tool was used to collect data from both male and female groups to get their perceptions of the decision-making trends between households among male and females. In addition, this tool was employed to find out the intensity of participation of male and female members in aquaculture activities at household level. Moreover, it was used to get views of both male and female member's about their involvement in various household activities. PAPSL users guide (1997) mentions scoring as a means of placing something in order. This tool involves asking a particular group of people about their involvement in particular activities. Locally available wild fruits/stones were used to score specific activities/involvement. No fruit/stones placed to show no activity/participation and 10 represents highest activity/involvement in that particular event. The respondents were asked to discuss issues among themselves and after agreement asked to score each and individual activities.

### **Venn Diagram**

Venn diagram is a tool that causes participants to review power and influence structures, by indicating relative power through the size of 'chappattis' allocated to each stakeholder, and relative influence through the distance between the placement of the chapatti and the central, core issue. This tool was used to collect information on sources of aquaculture information for community people in all study villages and also their linkages with various development agencies. This method was used to collect data from both male and female groups.

### **Mobility map**

Mobility of individuals can have significance impact upon people's livelihoods. In this investigation, the mobility of people from different wealth groups, both men and women, were sketched onto paper by during FGD to map out their formal and informal spatial access and to indicate the frequency of travel to various centres. A total of 60 mobility maps were produced over both phases.

#### **3.5.4 Semi-structured interviewing**

Interviewing as a prime research tool for data collection in qualitative research has been widely used. In case study research Gillham (2000, p.65) considered semi-structured interview as an important tool and mentioned that '*this is the most important form of interviewing in case study research*'.

Drevor (1995) specified that semi-structured interviewing could be used '*to achieve depth and roundness of understanding of social explanations rather than broad understanding of surface patterns, preferences and opinions*'. Moreover, she added several advantages, as follows:

- Gather factual information about people's circumstances
- Collect statement of their preferences and opinions
- Explore in some depth their experiences, motivations and reasoning

Semi-structured interviews can be used to collect in-depth information. It is also used to follow up ideas and to probe responses (Bell, 1993). Anderson (1998, p.155) mentioned that '*the interview is a prime source of case study data*'. The detailed data collection through interviews has been illustrated in **section 3.8.7**

### **3.5.5 Documents Review**

Documents, as secondary sources of information have been widely used in case study research. Yin (1984, p.79) suggested that documents provide useful evidence for case study research. He further cited that '*documentary information is likely to be relevant to every case study topic*'. Documents can be important sources of data (Hammersely & Atkinson, 1995; Denscombe, 1998). Document review is a commonly used data collection tools in case study research (Robson, 1993).

A larger number of documents such as Project pro-forma; Annual reports; Programme assessment reports; Monitoring and evaluation reports (Yin, 1984) produced by projects/organisations of the cases under investigation (NFEP, TDS, RDRS) were consulted and used as a secondary sources of data in this investigation. These documents provide information on programme evaluation, social and financial auditing. In addition, information from other relevant studies has also been used to cross validate data presented. Data from documents has been incorporated in to the case description, either to support or disagree with data collected by other sources, and are quoted in the text as and wherever appropriate. Recent review reports from various projects, in particular, have been good and current sources of information. Data on the impacts of interventions as such and its efficacy on people's livelihoods were the key information synthesized from such documents.

### **3.5.6 Research Assistants empirical experiences**

Data collection took place using a team of research assistants. The team composition, organisation and management of team are described in **Section 3.8.1**. The study author felt

it important to utilise their experiences as sources of data. Anderson (1998, p.155) mentioned that *'the successful case study often uses a team of researchers and benefit from the diverse and complementary strengths of each other'*. Accordingly, the research assistants were asked to make notes of most things they had heard or observed during the field visits. They were also assigned the task to write a summary of case reports for each village using their experiences throughout the period of data collection. This information, as explanations has been incorporated in case descriptions.

### **3.6 Development of data collection instruments**

The research instruments were developed in Bangladesh during May-June 1999. The following instruments were used to collect information:

Household socio-economic questionnaire (**Appendix 1**): This was divided into part 1, which includes respondent's profile and socio-economic information, and part 2, which includes information on pond status. This was designed to collect quantitative data, to put circles around the appropriate response in a category, from a scale (Nominal, or Ordinal and Likert scales).

Extension methodology questionnaire (providers)(**Appendix 2**): This included the respondent's profile, and details of the methodology being adopted to disseminate and train people in aquaculture techniques. The questionnaire included ratio scale, ranking and concluded with some open-ended questions. The questions were mostly designed following a Likert scale to know perceptions about the various aspects of particular interventions and their efficacy.

Extension methodology questionnaire (recipients)(**Appendix 3**): This questionnaire was prepared to enquire about the recipient's perceptions and opinions about the extension

methodology and was mostly in a similar format to that of the Extension methodology questionnaire for providers, in order to cross-refer the data.

Observation checklist (pond management practices)(**Appendix 4**): The checklist comprised 7 different indicators of pond condition and aquaculture practice, rated on a scale 1-5 where 5 indicates, for example, the physical conditions of a pond is best and 1 is worst.

Checklist for Key informant interviews (Extension Managers)(**Appendix 5**): This is a completely open ended questionnaire and a total of 11 different open ended questions were asked to collect information on perceptions about the extension intervention and its' perceived socio-economic impacts on the community. All interviews were recorded.

Checklist for Key informant interviews (Community members)(**Appendix 8**): This is also a open ended questionnaire and 5 main questions such as social situation; farming systems; educational status of the community; overall health situation; development intervention and networking pattern of the community were introduced as key topics. Each topic was broken down into several sub-questions.

Structured formats for PRA /Focus Group Discussion (**Appendix 6**): This was a guideline format for collecting information from different wealth groups on various aspects of livelihoods and of their livelihood strategy.

### **3.7 Piloting instruments**

Piloting is an important step to be included in the development of data collection methods. This helps the researcher to confirm about the instructions, wording; questions; and the overall techniques that are being used for collecting information (Bell, 1987; Anderson, 1990). All the tools used to collect information were tested before actual data collection started.



Piloting for the household socio-economic survey questionnaire (for pond owners) was done at Dangapara village under the Parbatipur Upazilla adjacent to the NFEP complex. The survey questionnaire included 28 items (socio-economic and aquaculture related). It was tested with 9 respondents of different wealth groups and took about 45 minutes to complete. Changes suggested included segmentation of the questionnaire as part I (socio-economic profile) with 23 questions and part II (aquaculture related) comprising 5 questions. In addition, question no. 1, on age groups, was changed from four to five categories.

The household socio-economic survey questionnaire (for non-pond households) was also divided in to part I with 23 items (socio-economic profile) and part II (interests on aquaculture) with 6 items before testing with 6 respondents in Haldibari village under the Parbatipur Upazilla. These respondents were chosen as representative of the actual target sample under investigation, based on the researcher's experience of the communities. Each questionnaire required 40 minutes to fill in. The respondents suggested no changes.

The Upazilla Fisheries Officer (UFO), Assistant Upazilla Fisheries Officer (AFO) and the Field Assistants (FA) at Parbatipur were requested to fill in the extension methodology questionnaire (for providers) consisting of 16 items. To pilot each questionnaire about 50 minutes time was needed.

The extension methodology questionnaire (for recipients) with a total of 16 items was also tested at Dangapara village with 9 respondents who were representative of the case villages. The respondents took about 50 minutes to answer each questionnaire.

The pre-testing of the observation checklist to measure pond physical condition of pond and management practices was done with 10 ponds in Dangapara village. Each checklist took 2-5 minutes to fill in.

Formats for focus group discussion and also the PRA tools used in this study were also tested carefully. The whole format was piloted on 2 different days, which included four different sessions. This exercise was done with four different groups of which two were male and two were female. The male team members worked with the male groups and the female team members worked with the female participants. Pre-testing was done at Kaibortopara village under Parbatipur Upazilla about 6 km away from the NFEP complex. PRA tools such as decision-making matrix, participation in aquaculture and household activity matrix were tested on the first day and the mobility map was done on the next day with both male and female groups.

### **3.8 The Fieldwork**

According to the research design, the fieldwork was carried out in two phases. In Phase 1, the fieldwork started in April 1999 and continued until March 2000 and this was followed by Phase 2 fieldwork, which ended in March 2001. The researcher spent about 24 months for data collection in the study area. At the beginning of April 1999, the researcher travelled to the four District Fisheries Offices and Upazilla Fisheries Offices to formally discuss the research with DFO's, UFO'S/ NGO officials. During the visit attempts were made to collect information about the programmes, such as the Model Fisheries Village Programme, The Trickle Down extension programme and the NFEP Demonstration/Trial programme. In addition, overall extension status within the area was also discussed to get an idea about selection of case villages, including the non-contact control village. After getting preliminary information from the UFO's and the NFEP extension Officer's based in each district, the investigator moved to the villages and collect information according to the checklist laid out for selection of villages

For selection of NGO case, the researcher met the RDRS Director of the Economic and Environment Division based at the regional office in Rangpur and discussed the research in early May 1999. At a later stage, the investigator also visited the District Co-ordinator,

RDRS Thakurgaon and the research plan was put forward to her. Cases were selected followed by intensive field visits and discussions with the UFO's, NFEP/RDRS Extension Officers based at each district.

### **3.8.1 Team Composition, Organisation and Management**

Since data collection involved the use of a variety of PRA Tools, it was necessary to form a small team to administer them before data collection could begin. The team comprised of two male and two female research assistants. It was advantageous that both the male assistants had a background in the field of fisheries, one had been a permanent staff member of the Department of Fisheries and had been working as a Field Assistant for the last couple of years and the other had a social science background and had worked for another researcher on data collection, in particular using participatory methods. In addition, recognising that the researcher is male and that many respondents within the study will be female, data had to be gathered from women in the communities with the assistance of female research assistants. These female research assistants were graduates, who also had experience in working in the area and had experience on data collection using participatory methodology. The team was briefed thoroughly about the research. They were provided with all formats designed for the study and supplied Bangla version of PRA tools and guidelines for data collection in the field. Training sessions were organised to discuss the detail about various data collection tools and techniques of data collection. In addition, aspects of communication skills have also been discussed. There had also been daily and weekly wrap up sessions to discuss areas for improvements during the whole period of data collection.

In Phase 2, two new female research assistants, one of whom was studying at Masters level and the other was a graduate, had to be recruited to replace the original pair. They were also briefed in the details of the research methodology and data collection, as before. It is important to note that the female assistants were given the opportunity to observe male

group sessions run by the researcher to get experience before they were involved themselves in data collection.

### **3.8.2 Rapport Building with the Community**

After final selection of cases both in Phase 1 & 2 a meeting was organised in each of the selected villages through the assistance of the local UFO and the Upazilla Co-ordinator for the selected NGO communities. The researcher along with male and female research assistants organised and attended meetings in all study villages. The objectives of the meeting were to; (Sarch, 1996; Mikkelsen, 1995;)

- ❑ introduce ourselves to the community members
- ❑ inform the objectives of the study
- ❑ explain the importance of their participation in the research process
- ❑ highlight the possible benefits of the research
- ❑ gain consent to the research
- ❑ clarify the role of both men and women in the research
- ❑ establish rapport with community members
- ❑ know more about the community

### **3.8.3 Wealth Ranking Exercise**

The wealth ranking exercises for Phase 1 and Phase 2 in ten communities were carried out in May 1999 and in July 2000 respectively. The communities were asked to classify their community according to various wealth groups on the basis of their perceptions. The detailed procedure has already been described in **section 3.4.3**.

### **3.8.4 Household Socio-economic, Extension methodology and Social Capital Surveys**

The household survey data was collected at intervals and two visits were made in both phases. For Phase 1, the 1<sup>st</sup> visit was made in 1999 and the 2<sup>nd</sup> was in February 2000. The researcher did the first ones in each village to give the research assistants experience. They

then conducted the rest of the survey. Data was collected from each respondent in their own home, at times agreed by them prior to data collection.

For Phase 2 the 1<sup>st</sup> visit was made in August 2000 and the 2<sup>nd</sup> was in January 2001. A total of 141 questionnaires were used to collect household socio-economic information from five communities in Phase 1 and 129 in the Phase 2 fieldwork. It is important to note that in Phase 1, data was gathered using two different questionnaires, this was difficult for both the data collector and the respondents. Realizing that, a single questionnaire was developed for Phase 2, it saved time and also things were comparable in single sheets.

The extension methodology survey, for both providers and recipients, was conducted at different intervals starting from December 1999 to March 2000 at convenient times determined by the respondents. A total of 12 questionnaires were distributed to the extension providers such as the UFO, NFEP Extension Officers, RDRD Extension Officers (Fish) and Senior Trainer (Fish) and were collected at the end of the day. For collection of the perceptions of recipients of extension services a total of 12 were chosen across from all wealth rank groups.

It is important to note that, after assessment of the first year's fieldwork, it was felt that the study required more information on Social Capital and accordingly a questionnaire was developed adapted from Krishna and Uphoff (1999) (**Appendix 7**). Data were collected from 10 respondents from each community, out of which 5 respondents were from Group I & II and 5 respondents from Group IV. A stratified sampling technique was adopted to look at the variability of perception on existing social capital from different socio-economic groups. A total of 100 respondents were surveyed from Phase 1 and Phase 2 villages. The research assistants conducted the survey between January 2000 and March 2001.

### **3.8.6 Data Collection using Observation methods**

Pond management practices of the pond owners of each community were examined following a structured checklist **Appendix 4**. Pond observation was made twice; once during pond preparation and stocking time between May and June and the 2<sup>nd</sup> observation was made between September and October, towards the end of the fish culture cycle in 1999 and 2000 for the respective phases. All parameters were scored on two separate occasions to reduce data bias. A total of 10 indicators were used to collect information on pond management practices, but 2 indicators were found confusing on the ground, even after piloting and dropped accordingly. A total of 141 ponds were observed in Phase 1 and 129 in Phase 2.

### **3.8.7 Data Collection from Key Informant Interviewing**

Interviewing has yielded very useful information, in particular, perceptions of extension providers both GO and NGO on various extension interventions. Interviewing key informants from the community provided in-depth information on community livelihoods, their preferences and opinions of various community development issues. Community members felt honoured and frankly expressed various issues during interviewing. Members of Group IV as key informants were excited since their voice has rarely been heard. Interviewing provided opportunities to probe responses and cross-validated data collected through focus groups discussion, in particular. Data was generated on the intervention approach and its impacts on the community through interviewing.

The data was collected from extension managers (TCO Team Leader, District Fisheries Officers (DFO), NGO Director, NGO Aquaculture Co-ordinator) who were interviewed following a structured schedule (**Appendix 5**) (**Section 3.4.5**). The interviews for the officials took place in their office chambers and precautions were taken so that no one interrupted the interview. The interviews were tape recorded with the respondents' permission in order to prepare detailed transcripts for further use for quoting comments in

the case descriptions, as and wherever appropriate. All the respondents were known to the investigator who had been working closely with them for the last 10 years. Phase 2 interviews were conducted between December 2000 and February 2001. Each interview took between 40-45 minutes.

Community members were interviewed following a structured checklist (**Appendix 8**) on various aspects of the community. The data collection took place between November 1999 and March 2001. It was not possible to tape-record the interviews since they did not feel comfortable having their opinions recorded, but notes were taken on the structured formats for further use. For each interview, one research assistant was employed to assist the researcher in note taking.

The community members were interviewed inside their house. These respondents were selected on the basis of their availability in the community from Group I&II and Group IV. The selection was made to collect perceptions from different economic groups so that opinions from various sections of the community could be considered. A total of twenty key informants in each community were interviewed for this purpose.

### **3.8.8 Data collection by Focus Group Discussion using PRA Tools**

In both phases, PRA/FGD sessions were used to collect data in two tranches on various aspects of aquaculture and upon their livelihood strategies. In Phase 1, the 1<sup>st</sup> tranche was conducted from October 1999 to early March 2000. The 2<sup>nd</sup> tranche was conducted from the end of March to the end of April 2000. A total of 60 PRA/FGD sessions were conducted in Phase 1 including both male and female respondents. The Male sessions were conducted at different times depending upon a number of factors such as local market day, local festivals/events, work load etc. The duration of each of the male PRA/FGD in the 1<sup>st</sup> tranche was about 4 hours and 2.5 hours in the 2<sup>nd</sup> tranche. The female sessions were shorter and were between 1.5 and 2.5 hours. The team of researchers travelled to the

communities and stayed overnight in two. The other villages had to be visited early in the morning and evening. Most male group discussions were held outside the house in communal areas. This provided opportunity to work on the ground. During PRA sessions the investigator was assisted by male research assistants to organise groups and to take notes during the sessions. At the end of each PRA session in each village, reflections were made among team members to discuss how well each exercise had gone and what steps needed to be taken to improve the overall data collection strategy.

In **Phase 2** the 1<sup>st</sup> tranche was conducted from the end of October to November 2000. The 2<sup>nd</sup> tranche was conducted from late January to February 2001. It is important to note that, in Phase 2, it would not have been possible to conduct PRA/FGD sessions in the Control village with Group III and IV participants due to their heavy workload for harvesting amon paddy during the day. These sessions were conducted during the evenings in consultation with the group members. Women's sessions were mostly conducted during the day after lunchtime. In both Phase 1 & 2, women's sessions were facilitated by women team members and the researcher acted as an observer.

It is important to note that quantitative answers are very subjective, such as fingerling stocking density, fish production, and consumption were recollected from memory. Most farmers do not maintain or keep records for their crop production and sale, in particular of aquaculture. Therefore, they had to rely upon memories or consult with household members to provide various information. Since the investigation attempted to assess impacts, it was therefore necessary to compare management aspects, production and distribution aspects between years.

PRA tools provided the opportunity to see things physically, the village, the ponds, the people, (male female, children), and their livelihood strategies from the ground, which by



using other data collection method cannot be achieved. Indeed, data gathering by PRA has been exciting from both the view of investigator and the community members too.

In the case of absentee respondents during group discussion/PRA, their sons/brothers for male respondents were included. In case of females, other female members of the household eating together (joint family) were included. For incidental events in two focus group discussions, one member in both cases was unable to attend and so sent a representative in their place.

### **3.9 Validity and Reliability**

Attempts have been made to ensure the quality of research since validity and reliability are crucial to any kind of research. The research required a detailed strategy to establish rigor in the whole research. Blaxter *et al.*, (1996, p.200) opined that '*validity has to do with whether your methods, approaches and techniques actually relate to, or measure the issue you have been exploring*'.

Yin (1984) recommended four tests to examine validity and reliability in case study research, which have been employed in this investigation, and are as follows:

**Construct validity:** This deals with establishing correct operational measures for the concepts being studied. At the outset of the study the researcher spent considerable time to define terms such as 'aquaculture', 'extension intervention', social structures, social development, sustainable livelihoods and poverty. The criteria and indicators of these terms were set within a theoretical understanding and relevant studies. To construct validity of any research, the use of multiple sources of evidence has been recommended (Yin, 1984). A number of tools such as survey questionnaire, structured interviews, observation techniques, a variety of PRA tools and documents were used to collect evidence of same phenomenon through the above-mentioned methods. Miles & Huberman (1994, p. 267) also stressed the importance of checking data using various sources of evidence for

triangulation and cited that ‘...by seeing or hearing multiple instances of it from different methods and by squaring findings with others it needs to squared with’. Data collected by FGD has been summarised in most cases by the participants. Transcripts for key informant interviews have been used to affirm the data validity. The draft case reports of Phase 1 case studies have been presented back to the groups of respondents to confirm validity of the data collected (Yin, 1994).

**Internal validity:** establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships. A case description strategy was followed to clearly generate an illuminative picture of each case under investigation (Yin, 1984). Case study analysis was done from the descriptions following a pattern matching technique (Yin, 1994) that can be used to identify causal linkages (Miles & Huberman, 1984; Denscombe, 1998;). Patterns and impacts of linked parameters within and between cases were explored from which working explanations of the interactions in each case, linked to the model in Figure 2.4, were built. Again, the working explanations that emerged from the Phase 1 study were crosschecked with Phase 2 findings to validate the Phase 1 findings against fresh data (Miles & Huberman, 1984).

**External validity:** It refers to establishing the domain to which a study’s findings can be generalised. Yin (1984) suggested that external validity of case study research could be confirmed by adopting what he called “replication logic”. This technique has been employed in this study. In Phase 2 fieldwork, a second representative set of cases were selected and studied. The explanations emerged from Phase 1 findings were matched with Phase 2 findings to affirm external validity and generalisability of the study. In addition, selections of five identical cases also allowed a comparison of multiple cases; selection of multiple cases also allows generalisability of the study. This has been rightly pointed out by Crossley *et al.*, (1984 p.204) as ‘comparative case-studies can also used to enhance the potential generalisability of research findings’. They further added that the main strength

of case study techniques as a research methodology lies in their maximisation of ecological validity of data.

Henry (1990) suggested considering the following issues, in regard to the generalisability of qualitative research:

- ❑ listing study population;
- ❑ appropriate selection technique;
- ❑ number of cases needed to study;
- ❑ selection of representative sample and
- ❑ obtaining reliability of data

The above issues were carefully considered and are laid out in Sections, 3.3, 3.4 and 3.9 to ensure generalizability of the study findings.

**Reliability:** Reliability is demonstrating that the operations of a study - such as data collection procedures - can be repeated with the same results. To ensure reliability in case study researches Yin (1994) suggests establishing a case study protocol, which for this investigation is outlined below.

- Overview of the case study project
- Detailed field procedure
- Specific research question
- Similar formats for each case study report
- Formats for representing the results

The protocol was followed in each of the cases. The overview of the case study project has been outlined in **Chapter 2**. The detailed data collection and fieldwork procedures have been described in **Chapter 3, Section 3.8**. The research questions have been set out in **Chapter 2 section 2. 9**. The individual case studies have been written up, using similar formats, and can be seen in **Chapter 4**. Data handling, synthesis, data analysis and

presentation of results have been conducted following the coherent techniques suggested by Miles & Huberman (1994) (See **Chapters 5 and 6**).

Above all, the investigation had the clear objective of developing a working hypothesis using findings from Phase 1 of the study. To develop a hypothesis specific questions were set out at the early stage. A checklist was prepared detailing type of information required, potential sources of information and methods for data collection. Individual case reports have been written up using similar format. Data has been analysed to find pattern of similarities and dissimilarities using principles of pattern matching techniques. Explanations were made to build up hypothesis using Phase 1 study findings.

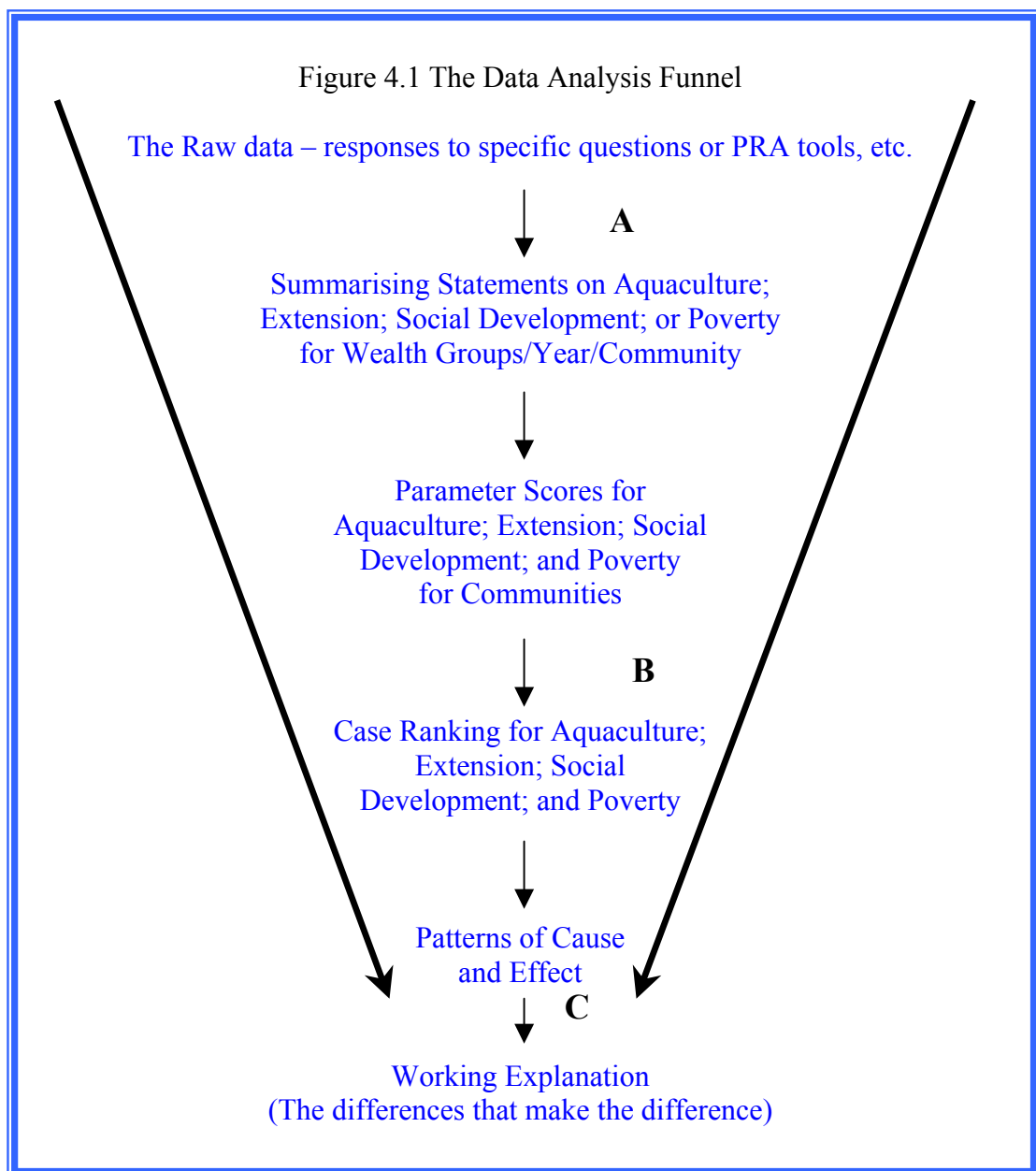
The same procedure was followed in Phase 2 for gathering data. The theoretical propositions built from each case in Phase 1 have been matched with Phase 2 findings. Thus conclusions have been drawn.

**Table 3.4: TIMING OF RESEARCH ACTIVITIES**

<i>Activities</i>	<i>Phase 1</i>	<i>Phase 2</i>
Designing the Research	September 1998 - March 1999	
Selection of Cases	April 1999	April 2000
Wealth Ranking of Cases	May – June 1999	July 2000
Development of Data Collection Tools	July 1999	
Household Survey Data Collection	August 1999	August 2000 – January 2001
Focus Group Discussions	October 1999 to Feb 2000	October 2000 to February 2001
Key Informant Interviews	December- January 2000 to March 20001	
Data Analysis	April 2000	March 2001
Phase 1 Case Reports written up	November 2000	
Cross case comparisons and Phase 2 data analyses complete		July 20001

## CHAPTER 4: RESULTS AND ANALYSIS

In this section I will explain the organisation of case reports and how the findings derived from each case have been analysed and an overall explanation of the operation of interventions synthesised. An outline of the detailed process is set out below which forms the basis of the approach taken to data analysis and interpretation (see Figure 4.1) to reach a conclusion about the cases under investigation, and which in many ways is the inverse of the data collecting process outline in **Section 3.4**.



The results of the 3 steps in this funnelling process have been presented in 3 different forms:

- A. Case description
- B. Cross Case Comparison and
- C. Working explanations

The following Section deals with the detailed process of how Case Descriptions were generated:

#### **4.1 Case Descriptions and Structures**

Miles & Huberman (1994, p.90) termed case description as *'making complicated things understandable by reducing them to their component parts'*.

Writing and presenting a case study report is difficult, since it does not follow any particular stereotypic forms (Yin, 1984), but the compositional phase, as he pointed out, is an opportunity to contribute to knowledge or practice about the cases under investigation.

Yin (1994, p.132) suggested six different types of structures of case study reports. A linear analytic structure was adopted in this study since he cited that *'this is a standard approach for composing research reports. The sequence of the subtopics involves the issue or problem being studied, a review of the relevant literature, the methods used, the findings from the data collected and analysed and the conclusions and implications from the findings'*. Following the type of multiple case version (Yin, 1984, p 178) individual case reports was written up. A standardised format was followed for writing case descriptions since Miles & Huberman (1994) *'cross case data need to be made comparable via common codes, common displays of commonly coded data segments and common reporting formats for each case'*. Data for each community, and summary statements made at the end of each section are presented in Tables 4.1 to 4.10.

**Table 4.1: Village profile: Control 1**

Sl.No.	Profile	1996	1999
1	Total Number of population	344	395
2	Total number of households	54	99
3	Average family member/ households	6	4
4	Average number of children/household	2	2
5	Total number of female headed household/ widow	14	12
6	Number of Primary school	0	1
7	Number of NGOs	1	2
8	Number of Mohila samity	2	2
9	Number of Mosques	1	1
10	Male club	0	0
11	Number of NGO School	0	0
12	Number of temple	1	1
13	Number of Maktab/Madrassa	0	0
14	Number of high school	0	0
15	Number of college	0	0
16	Number of health centre (GO and NGO)	0	0

Source: Suruj, Harmohon, Nurul, Umesh, Baishagu, Suren, and Hedela.

**Table 4.2 CASE SUMMARY: Control 1**

### **Aquaculture**

There are 28 ponds in the community. Out of which 10 are seasonal and 18 are perennial ponds. Among the ponds 18 are owned individually and 10 have multi-ownership. The average water area of the pond was 12 decimal.

Physical condition of the Group I & II ponds were better than Group III and Group IV in terms of water colour, integration of pond dykes and presence of weed fish.

The members in the community as reported stocked a total of up to 8 different species during focus group discussion among various wealth classes. Farmers reported that they were stocking a variety of species, both indigenous and exotic species including those caught from wild sources by Group I&II and III. Stocking regimes are higher than those recommended by all extension approach and were up to 118/decimal. Group IV reported to have stocked about 99 fingerlings/decimal, which was less than others. Stocking regimes are still higher than the recommended by any of the extension approaches in the study and were highest among Groups I & II and III.

Fry traders were the only source of fish seeds for all groups. No one reported to buy fingerlings from local nursery and or private hatcheries.

Respondents indicated to use 5 different types of inputs during focus group discussion by different wealth categories. Use of inputs was found to be very poor amongst all groups and were mostly applied irregularly. There were no differences in the use of inputs among groups. No changes of use of frequency and use of inputs between years.

The average production in 1996 was about 5.02 kg/decimal and stood at around 6.5 kg/decimal in 1999, which was mentioned during focus group discussion with various wealth groups. There has been an increase in production among all groups. The incremental increase is higher among Groups I&II and III. There has been little discussion on fish culture among fish culture. Female members of Groups I&II and III reported that their partners had discussed aquaculture with them but only limited to feeding. The average fish consumption from natural sources had gone down by about 20% and was

higher among Group III and IV. People from all groups reported to eat a variety of wild fish species.

Fish consumption from ponds increased by 20% in Groups I&II and IV, there was no change in consumption of fish by Group III from the same source.

A few members from Group I&II and III reported selling fish at the town market and pond site and Group III respondents sold fish at the pond site. Group IV did not sell fish in 1996 or in 1999. Group III informed that money from selling fish had been invested mainly for agricultural production and buying food. Group I&II invested their income in crop production. Fish sales were limited to Groups I & II and III and the contribution of fish, in general in this village, to household income is negligible. The level of technical aquaculture is quite low in this village.

#### **Social Development**

The proximity to local social services (sub office) was fairly good but not close to the Upazilla local social services.

The community reported having contact with a few interventions. Extension contacts by other agencies were hardly mentioned by the villagers. Health visitors visited the village to advise on women's health and family planning. People reported to visit government health clinic situated at the adjacent village. Fish culture within various groups in the community is also rarely discussed. Fry traders were the only external sources of fisheries information. One unemployed youth reported to receive fish culture training towards the end of fieldwork from the Upazilla Fisheries Office. People's linkages with development interventions were found poor.

CARITAS and GRAMEEN BANK provided credit to few people in this community in between 1996-1998 but now they have withdrawn support. Women's access to information was found very poor. Sugar Industry as a commercial interest group, is working in this village and have been advising contact farmers on cane production. The number of agencies involvement in the

community was poor and no significant changes between years.

Informal networking and mutual support among community members was poor. Trust, reciprocity and solidarity in the community were poor. There has been no community collective action during the last five years. It is important to note that people were not able to utilise opportunities to diversify their livelihood strategy and to participate in events for social interaction. Ultimately they lacked the find means to meet higher levels of need, such as affiliation, self-esteem etc. Linkages with outside institutions and information access were very poor. The community as a whole lacks well-being in relation to interactions and self-esteem. Creating awareness about possible interventions, opportunities and resources available to them could increase their ability to pursue for better means of living.

#### **Extension**

Although this community is presented as a null case and has poor access to information and external intervention, it must be noted that there has been some minor external involvement. A few people had linkage with the sugar cane mills nearby.

#### **Poverty**

The choices of food items are marginal between groups. Only Group IV respondents reported to suffer from food deficit up to 3 months in 1999. Females of the above group even indicated to have experienced particularly less food during food shortage. . Groups III and IV have infrequently eaten these food items. Group IV reported to suffer from food deficit up to 3 months and had poorer diets.

About half the people are drinking multi-owned tube well water. A few drink own tube well water. A few used well water for drinking. There was a positive shift in drinking water trends among all groups with a higher increase in-Group III and IV members with a narrow gap between Groups I&II and IV.



There were no pacca house or house with a tin roof and brick walls except one pond owning household from Group I & II.. About half the houses are made of thatched roof with earthen wall. Few houses were made up of tin roof and thatched/earthen wall. Some houses built of thatched. It is important to note that only Group III members made slight change in their housing conditions.

There was no pacca latrine in this community. Some reported to have katcha/slab and katcha/well latrine. A large majority of people from Group III and IV reported having no fixed place for solid wasted disposal. There has been only a little positive change of the type of latrine use between 1996 and 1999.

Common health problems for men were cold, fever and aches among all groups. Gastric problem reported as a common health problem for Groups III and IV males. Group I&II females reported common colds, fever and headache only. Group III and IV, in particular, indicated to suffer from acute health hazards including diarrhoea and dysentery. Children among all groups were reported to suffer from scabies, worms and diarrhoea and dysentery. This is probably due to disposal of solid waste in open places. Respondents from all groups mentioned that the local village doctor was the first contact person to visit during health difficulties. Group III and IV males also visited kabiraj (Herbalists) for medication. Females of Group I & II and III mentioned that they visited charitable medical facilities in the neighbouring village but Group IV women did not report any such instances.

None of the respondents reported attending in village Salish (informal local court) in between years. This is due to the fact they these people are sharecropper and heavily relied upon their landlords. Only one member from Group III respondents was attached to puja committee. In addition, no one was found who participated in local government leadership. There was even no village club. None of the female members neither took part in Salish nor

reported any memberships except NGO credit group. They did not participate in mixed group meeting. Most women among all groups are adopting birth control techniques. But the rate was higher among group IV households. Group IV members also reported adopting permanent methods.

The male members mostly do fish culture but few female farmers from Group III and IV were found involved in most activities such as pond repairing; weeding; feeding, fertilising and fingerling stocking. None reported to harvest fish, and sharing ideas on fish culture with others. Participation in aquaculture was much higher among Groups III and IV females. Males from all wealth group reported females' involvement in feeding only. A few from Group I&II and III females agreed that aspect of fish culture was discussed by their male partners. There were slight positive changes in decision making among Groups I & II and IV between years.

Education and literacy rate among Group I&II male members is higher than Groups III and IV. It is interesting to note that none was found who had received education above secondary levels. Only few female members from Group I&II had formal education. Rest of the females among all groups reported that they cannot read or write nor can sign. The signatory ability of Group III and IV members increased between years. It is worthwhile to mention that some of the female group members of Group IV said that their children were not going to school. Only one member from Group I&II reported attending training on sugar cane production in 1996.

There were limited recreation options for both males and females. Mobility of all groups of people was very limited. Group IV members reported selling their labour in advance, and women and children of this group are working in the field.

**Table 4.3: Village profile: Trickle Down 1**

Sl.N°	Profile	1996	1999
1	Total Number of population	595	630
2	Total number of households	85	104
3	Average family member/ households	7	6
4	Average number of children/household	2	3
5	Total number of female headed household/ widow	12	18
6	Number of Primary school	1	1
7	Number of NGOs	3	5
8	Number of Mohila samity	3	4
9	Number of Mosque	1	1
10	Male club	0	1
11	Number of NGO School	0	3
12	Number to temple	0	0
13	Number of Maktab/Madrasa	0	0
14	Number of high school	0	0
15	Number of college	0	0
16	Number of health centre (GO and NGO)	0	0
Sources: Afazuddin, Motleb, Idris, Razzak, Halim			

**Table 4.4 CASE SUMMARY: Trickle Down 1****Aquaculture**

In this village, there are 28 ponds out of which 19 are seasonal and 9 are perennial respectively. Of which 26 are singly owned and 2 have multiple ownership. The average water area of pond was 10 decimal.

No noticeable differences in physical condition between Group I&II but Group IV was worse in embankment condition, integration of dykes and shading condition.

Stocking density of ponds was high among all groups compared to that recommended by the Trickle Down approach to extension. Group I&II reported to stock 05 selected species and also reported to replace fish species in 1999 for higher production. Group III reported to stock up to 10 different species of fish including local catfish, snakeheads with a maximum of about 110/decimal which very high compared to the recommended by the trickled down approach to extension. Fry traders were the only sources of fingerling in this locality.

A total of up to 7 different types of inputs accounted to use by the community members. A large number of inputs were reported to be used by the respondents. It is worthy to mention that the usage of inputs was much higher amongst Groups I&II and III and frequency of use was good. The frequency and use of inputs was significantly higher among Groups of I&II and III compared to Group IV. Changes in frequency and use of inputs were positive among all groups but the trend was more positive among Groups I&II and III.

There had been a slight increase in fish production. In 1996 the reported estimated production was about 5kg/decimal, which stood at about 7.5 kg/decimal in 1999. Average fish production was reported to be high by respondents in Groups I & II and III. It is worthy of mention that only female members of Groups I&II pointed out that their male partners have discussed fish culture but only feeding. Group III and IV opined of no discussions.

Fish consumption from natural sources declined among all groups. The average fish consumption from the same sources declined by an average of 40%, 50% and 25% among Groups I&II, III and IV respectively.

Consumption of fish from pond sources increased by 62%, 68% and 39% among Groups I&II, III and IV respectively. There was a slight increase in fish consumption by Group I&II members.

Fish consumption from the market increased by 20% and 37% among Groups III and IV respectively. Consumption of fish among all groups follows similar pattern.

Very few from Group I&II reported to have sold fish and the money invested on agriculture and medical care. There had been no sales in the case of Groups III and IV members in 1996 and in 1999. Aquaculture probably contributing very little proportions in their income but only limited with Group I&II only.

### **Social Development**

The community is very close to most local social services. The community has contact with reasonably large number of development interventions including from the Government and the NGO sector and are sketched below in the following table. A large number of was reported working in this community in credit programme and health and sanitation programme.

Quite a few people have contact with few organisations. A few members from Groups I&II and III reported having received training on rice cultivation from Bangladesh Rice Research Institute (BRRI) and maize production from Department of Agricultural Extension (DAE) in 1996. The Bangladesh Agricultural Development Corporation has contact farmers to grow potatoes as a commercial enterprise in 1999.

There was a compost demonstration established by the DAE in 1999.

It was observed that CARE GO-inter fish were studying feasibility of their intervention in this community. RDRS, GRAMEEN and UDP (NGOs) were reported to have worked in 1996 and BRAC, Islami Bank (NGO) and DANISH agency (Health programme) were reported working in 1999 and are still continuing to provide credits and health support services, particularly, for the poorer section of the community, women in particular. The number of NGOs has increased in 1999. This community is located adjacent to a population centre, which provides access to a larger number of institutions and external interventions, but these contacts have been uncoordinated, although some interactions have taken the form of “Social Development”.

Social structure are at a moderate levels. Informal networking and mutual support among community members was fair. Trust, reciprocity and solidarity in the community are fairly good. Community collective actions were reported as well. By and large, this community is reasonably rich in social structures and institutions. It has moderately high access to formal and informal social structures, which provide chances to be involved in social events and facilitate more interactions and enhancement of social progress and it is blessed with high off-farm opportunities. Females’ access to credit was about half.

### **Extension**

The overall aim of the programme was to demonstrate and transfer semi-intensive fish culture technology to the locality and to establish a local extension agent, the Result Demonstrator (RD). The programme targets mostly

innovative male farmers who are generally from the rich and medium farmers (Groups I & II). The programme offers semi-intensive fish culture technology to the RD and Fellow Farmers (FF). The RD and FF have increased their production. Two half day training was organised at the training centre and a half-day pond site training was organised for the RD. There was no provision of inputs in the programme

The major role of the extension officer was to transfer semi-intensive fish culture technology to the targeted farmers.

A large variety of extension methods have been used with major emphasis on pond site field visits and individual counselling. A large number of extension materials have been used and manuals and pond record books were provided to the farmers.

The programme is cost effective if the value of time is not considered against the number of farmers contact. Monitoring and evaluation is controlled but results are shared at various levels and well documented. There is provision of adaptive research in the programme.

### **Poverty**

The choices for food was highest in Group I&II. Groups III and IV had a similar food pattern. Group I&II reported to eat meat and fish throughout the year where as respondents from Group III and IV indicated to eat limited months. . A few Group IV respondents mentioned deficits in food in 1996 and 1999. Group IV members reported to suffer from food deficit up to 3 months and had poorer diets compared to others. Females from this category stated to get less food during food crisis.

All of the members of this community were drinking tube well water in 1999. A large majority of members were drinking own tube well water but only a few from Group IV reported drinking water from a multi owned sources. There has been a positive shift in drinking water trends among Group IV members.

There are a few pacca houses in this community. Some houses were built with tin roof and earthen wall. A large majority of houses built of tin roof and thatched wall. There were a few thatched houses in this community. There were a few houses that are very spacious with concrete roof and garden space in front of the house for various activities. There were no remarkable changes between 1996 and 1999 in housing condition although few members from wealth Groups III and IV had made improvements and moved to upper strata. The highest changes made by Group III members. The proportionate gap in housing between Groups I&II and IV was high.

A few people were using katcha well with slab. Few reported has been using katch/well latrine. Some indicated to use pacca latrine. A few from the Group III and IV reported having no fixed place for solid waste disposal. There were positive changes in the availability of latrines amongst Groups III and IV and the change was most marked in Group III. The proportionate gap between Groups I&II and III was moderate.

A few members from Group I&II reported to suffer from high blood pressure and diabetic which was not reported by other group members. A few male members from Group III reported to suffer from gastric problems and body ache. Group IV

members mentioned of body ache and common cold only. Group I&II females reported suffering from common colds only. But Group III and IV female members indicated occurrence of common cold; gastric; general weakness; headache etc. Children among all groups reported to suffer from cold and fever. Groups III and IV children were reported to suffer from worms, diarrhoea and dysentery as well. The village doctor was the main health contact for all groups. Group I&II and III members reported to visit specialists too, whereas Group IV members visited village doctors as the first contact but they also reported to go the government hospital in acute cases. Group IV females also reported to visit government hospitals as well.

People from all sections of the community found participated in Salish. But the number is higher among Group I &II and III. A large number of Group I&II members reported to participate in local government/village committee/village clubs and also reported of being members of school, madrasa committee. Only a few reported from Group III reported memberships of school and madrasa. None from Group IV reported involved in these institutions. None from the female community reported participating in Salish. While asked responded that males/husbands do not liked it. Society does not allow it. Again none reported representing local government neither memberships in whatsoever in any committee.

About half among all groups but reported higher in Group III. Group III and IV members also reported to adopt permanent methods.

Women's participation in aquaculture was low and there were no changes in participation in

aquaculture among Groups III and IV members. There were increases in women's participation in decision-making among all groups between 1996 and 1999 with Groups III and IV indicating higher levels of involvement in decision-making.

Improvements in male credit in 1999 were indicated among Groups III and IV members. Improvements in female credit in 1999 were indicated among members of Groups III and IV and was most marked amongst Group III.

A large majority of male members had formal education, however the participation in higher level of education was higher among Group I&II and III members with a few from Group I&II had no formal education. A few members from Group I&II and III reported to receive training on high yielding variety rice cultivation, fish culture. None from group IV reported received any sorts of training. In general females formal education rate is low and is limited with in primary levels. There was a remarkable in crease in signing ability among Group III members as indicated of being NGO memberships A few from Group III reported to receive training from NGOs on poultry. None from Groups I&II and IV reported receiving formal training. When they were asked reasons they replied that no one had asked/did not get opportunity.

Groups I&II and III have more recreational options compared to Group IV. But Group IV reported to have moderate options compared to other communities. There were no differences among wealth groups.

Mobility among males was high among all groups. There were no significant differences among

various wealth groups. The pattern was similar in female groups. By and large, a large majority of community members are meeting

their higher levels of needs moderately well.

**Table 4.5: Village profile: Demonstration 1**

Sl. N <sup>o</sup>	Profile	1996	1999
1	Total Number of population	486	582
2	Total number of households	86	129
3	Average family member/ households	6	5
4	Average number of children/household	1	2
5	Total number of female headed household/ widow	27	29
6	Number of Primary school (GOB)	1	1
7	Number of NGOs	5	6
8	Number of Mohila samity	3	4
9	Number of Mosque/Moktab	1	1
10	Male club	1	1
11	Number of NGO School	1	1
12	Number of temple	0	0
13	Number of Madrasa	1	1
14	Number of high school	0	0
15	Number of college	0	0
16	Number of health centre (GO and NGO)	0	1
Sources: Mostafa1, Dulal, Mostafaz, Kebarat,			

**Table 4.6 CASE SUMMARY: Demonstration 1**

#### **Aquaculture**

There are 25 ponds of which 19 are seasonal and 6 are perennial. Of these 16 have single ownership and 9 are multi-ownership. The average water area of each pond recorded was 9 decimals.

Physical conditions of pond were reported similar among wealth groups however, the embankment status, presence of wild fish in Groups I&II and III members were in a better situation. On the other hand, watercolour of ponds was found to be better among Groups III and IV. No noticeable difference in physical condition of ponds between groups, but Group IV was worse in embankment situation.

A total of 8 species was found to stock among groups. Indian carps with silver carps are common to all groups. The stocking regies varies from 100-120/decimal.

Group IV members found stocking more compared to other groups. Stocking density in Group I&II and IV decreased in 1999. Stocking regime was higher than recommended.

Fry traders were the only source of fingerling in this community. None reported to buy fingerling neither from nursery producers nor from any private or government hatchery.

The community members identified only 5 different types of inputs.



Group I&II members indicated irregular use of cow dung and rice bran in their pond only. Group III mentioned to use the same inputs irregularly with mustard oil cake used seldom. Group IV also stated to use cow dung and rice bran irregularly but indicated to use inorganic fertiliser and green leaves seldom. The use and frequency of inputs was poor and was slightly higher between Group I&II and III. No changes in the use and frequency of inputs between years.

The average production was about 5.03 kg/decimal in 1996 and was about 7.00 kg/decimal in 1999. Only Group III and IV females reported that their partners had discussed about fish culture but mainly focused to species selection, stocking and feeding. Changes in fish production between years were positive among all groups. Group I&II and III had slightly higher production.

Wild fish consumption among all groups declined with an average of 33% from 1996. Key informants who are community members stated to moderate decline of fish consumption from the said source.

Fish consumption from pond slightly increased amongst in all groups and was 63, 32 and 35 kg/household indicating an average increase of about 17% from the 1996. All group reported to eat silver carp but the rate is highest in-Group IV most. Rui reported consumed less by all groups among Indian major carps.

A few members only from Group I&II mentioned receiving fish as gifts but only a very small amount.

Very few people reported to sell fish and the investment made on agriculture. Group I&II sold fish at the pond site to fishers and Groups III and IV sold at the local market.

Group IV members reported to buy food items from selling fish. 1 member from Group III reported to buy fingerlings from the money earned by selling fish.

### **Social Development**

The community is very close to the Upazilla head quarters and hence with local social services.

The community have contacts with few development agencies both government and non-government. The key informants from the community admit this during interviewing. None reported to have received training on any subjects. One key informant who is a member of Group I&II stated of slow increase in training facilities, the other key informant from Group IV indicated of no training facilities. BRAC, GRAMMEN BANK, ASOD, CARITAS, GKF (Specially for females) have been working for last few years providing credits to the poor and landless people. People have reported to have close contact with the health centre due to its close proximity.

Fry traders were the only sources of fisheries information, however, a few Group I&II members reported receiving information on fish culture from neighbouring farmers. The demonstration farmers admit to lost contact with the fisheries office and advised none in 1999.

One key informant from Group I&II indicated that they are enjoying a reasonable credit facilities but the other key informant from Group IV reported of very less credit facilities. It was indicated that people also have access to credit. People do not seem to utilise service providers even though this community situated close by the Upazilla centre.

It is interesting to note that when key informants from the community were asked about the linkage with

officials and organisations Groups I&II member mentioned of Group IV people having most contact where as Group IV members had opposite reply.

Very few people had contact with local extension services. Although this community is located adjacent to the Upazilla centre the people are still not able to utilise resources available to them. The community members indicated only having contacts with agriculture, livestock and commercial banks. Both male and female members indicated that they visited only the health centre quite frequently since this was located close by. There has been very weak links with the institutions around. Only Groups III and IV female members have frequent contact with NGOs, as reported during focus group discussion. No noticeable changes in agencies involvement in the community between years.

Although this community has access to a large number of institutions and interventions there is a distinct lack of linkages with external interventions. Informal networking and mutual support among community members was reported as relatively poor. Trust, reciprocity and solidarity in the community were poor. Community collective action was low. Proximity to institutions could have been used efficiently and frequently. Females' involvement in income generating activities is gradually increasing and therefore their role in decision-making also indicated a positive shift.

### **Extension**

The overall aim of the demonstration programme was to show feasible fish culture technology and to disseminate it to neighbouring farmers. This is a poverty focused extension programme. Models and methods of

fish culture information appropriate for poor farmers are being given to the demonstration farmer.

Three half day center based training has been provided to the demonstration farmer but the approach is flexible. Non-refundable credits/inputs are being given to the demonstration farmer with farmers' contribution encouraged. Very few extension methods have been used with major emphasis given on individual counselling and methods demonstration. Very few extension materials have been used and only handouts as a manual was given to the demonstration farmer. The general overall perceptions and prevailing opinions in the past suggest the programme as cost expensive programme. There was provision of adaptive research in this programme.

### **Poverty**

None from Group I&II indicted food shortage between years. A few members of Groups III and IV indicated food shortage in 1999 and also females get less food during crisis. Group III men informed that they have food deficit while women gave opposite reply. Group I&II and III had greater options on food selections. A few Groups III and IV members reported food deficit up to 6 months in 1999. A few members of Groups III and IV indicated food shortage in 1999 and also females get less food during crisis.

About half of the people reported drinking own tube well water. Some members indicated drinking water with multiple/community ownerships. There had been a notable change in drinking tube well water amongst Group III and IV members. It is interesting to note that All members drinking tube well water in 1999. The changes made due to the supply of tube well from the local government from development projects.



There were a few pacca houses in this community. Some houses were also made up of tin roof and brick wall. About half of the houses were built up of tin roof and thatched wall. Few houses were found spacious in nature with except from the local leader house. There has been slight improvement of housing condition among all groups. The houses are in cluster form.

There were some pacca and few katcha well and slab latrines. About half the people reported of no fixed place for disposal of solid wastes. There was slight improvement in latrine usage in Group III and IV. It is important to note that about half have no fixed place to dispose solid wastes indicating a poor situation in solid waste disposal.

People from all categories reported to suffer from stomach pain, diarrhoea and dysentery. There are similar disease problems also reported by the female groups.

Children suffered from diarrhoea, scabies and worms in all groups. Seeking medical service from village doctor was common to all groups in 1996. Group I&II and IV members mentioned that they had been visiting government hospitals for medical treatment in 1999 which was established recently just adjacent to the village.

Group members from I&II and III was only involved in Salish. No one was reported to be involved in local government representation. There was no indication of female participating in Salish. Female members pointed out high rates of children by choice from all groups. A large majority from Group I&II reported to adopt birth control techniques, where as about half in Group III and IV. It is interesting to note that Group III and IV noted

higher rate of adoption of permanent methods.

Fish culture again proved to be as a male dominating activity. Group IV females seen to have significant role in fish culture than Group I&II and III, which is shown in the following graphs. Females' involvement mostly includes feeding fish and throwing household wastes both as feed and fertiliser. It is worthy to mention that there was no change in women decision-making role between years.

There were positive changes in women's decision making between 1996 and 1999 and were similar across wealth classes but Group IV indicated a higher levels of participation which was significant compared to Groups I&II and III.

A large majority of males have formal education and the rate was higher in Group I&II than III and IV. The similar trends were observed in female education. Some Group IV females reported to have signatory ability only in 1999.

Only one member from Group III mentioned to received training on aquaculture in fish culture in 1996. When asked reasons for not participating in training all said no one asked/did not get opportunity. One female Group III female members among all groups pointed out to receive training only. The reason for poor participation in training was stated similar to the males.

Means of recreation are limited for both males and females. On the whole, a large number of members in the community were unable to meet their lower level needs.

**Table 4.7 Village profile: Model Village 1**

Sl.N°		1996	1999
1	Total Number of population	680	743
2	Total number of households	85	106
3	Average family member/ households	8	7
4	Average number of children/household	2	3
5	Total number of female headed household/widow	33	42
6	Number of Primary school	1	1
7	Number of NGOs	3	4
8	Number of Mohila samity	1	1
9	Number of Mosque	1	1
10	Number of Male club	1	1
11	Number of NGO School	1	1
12	Number of Temple	1	1
13	Number of Moktab/Madrassa	0	1
14	Number of high school	1	1
15	Number of college	0	0
16	Number of health centres (GO and NGO)	0	0
Sources: Tobarak, Anowar, Tomiz, Royal, Sattar, Madan			

**Table 4.8 CASE SUMMARY: MODEL FISHERIES VILLAGE 1****Aquaculture**

There are 2 seasonal and 29 perennial ponds of which individuals own 21 and 10 with multiple ownerships. The average size of ponds was recorded as 20 decimals.

There was very little difference in pond condition among various wealth groups. Layers of red scum were recorded in-Group I&II as high compared to other groups. There has been no indication of deliberate integration of pond dykes. In terms of pond shading, Group I&II ponds were in inferior condition than other groups. No significant differences in physical conditions of pond among various wealth groups.

Stocking density among all groups was reasonably higher than recommended and particularly higher among Groups III and IV compared to Group I&II in between 1996 and 1999. Species combination was good among all groups.

Ponds were reported to be stocked with a variety of species

including indigenous and exotic species as reported during focus group discussion. Stocking regimes are reasonably near to those recommended in model village approach to extension and the range was 71-89/decimal. It is interesting to note that Group IV reported stocking with 7 different species including Tilapia and stocking at slightly higher numbers than other groups. Silver carp was a common species and stocked by all wealth groups. Group I&II and III indicated stocking fewer fish species but giving priority on stocking Indian major carps and silver carp. There was a slight increase in stocking rate than 1996 among Group III and IV people. There was a slight increase in stocking rate than 1996 among Group III and IV people.

Respondents reported using 9 different types of inputs during focus group discussion. The number of inputs and frequency

of input usage was higher among Groups I&II and III and used regularly. The use and frequency of inputs was significantly higher among Group I&II and III compared to Group IV. No changes of use and frequency in inputs between 1996 and 1999.

Average fish production in 1996 was about 9.06 kg/decimal and this increased to 11 kg/decimal in 1999. It is important to note that fish production is higher in wealth Groups I&II and III compared to Group IV. Females from the same pond owning households during focus groups discussions also reported their male partners discussed with them about fish culture but mostly about feeding and fertilisation.

Fish consumption from wild sources declined among all groups. In 1999 the average consumption of fish from natural sources were 25, 60 and 25 kg among Groups I&II, III and IV respectively with an average decline of about 55% from 1996. Major species included puti, dankina, snakeheads etc. Only some from Groups I&II and III reported eating climbing perch and big snakeheads.

Fish consumption from pond has decreased to about 11%, 20% and 6% in wealth Groups I&II, II and IV respectively. It is important to note that the amount of fish eaten from pond sources is still much higher than the other four case villages. Among culturable species silver was reported as eaten most by Group III and IV.

Consumption of fish from the market have declined in-Group III and IV by about 25% and 40% respectively. Dependency on natural fish by group IV seems low in this community. Only a few Group I&II members reported to receive fish as gifts from neighbours or relatives.

During focus group discussion all group members reported to sell fish in 1999 at the pond site. The numbers of farmers selling fish was highest among Groups III and IV. When asked about the disposal of income from fish sales Groups I&II and III reported that they spent the money on agriculture. Group IV reported to spend the money on agriculture and other purposes. Number of farmers sold fish sale was higher among Groups III and IV members.

### **Social Development**

Closeness to local social services is moderate.

The community has contact with a large number of development interventions and agencies both government and non-government. There are 4 NGOs working in the village who are assisting mainly poorer women in the community with credit facilities. People also reported having frequent contact with the Upazilla Agriculture Office to receive advise on crop production. It was also indicated that people from all categories had access to credit from commercial banks. There are several sources of fisheries information in this village, for example, fry traders, local nurseries and innovative farmers. When discussed with farmers they indicated a good linkage with the Upazilla Fisheries Office and the fisheries office has confirmed this. People reported receiving continued support from the office. The following agencies were reported working in this community by the community members during a group discussion.

The community has a greater range of both formal and informal social structures,

which provide opportunities to engage and participate in social events. The club has been a very useful place for interactions and entertainment. Informal networking and mutual support among community members is good. Trust, reciprocity and solidarity among community members are good. The formation of fish clubs and group leaders might have contributed to generate social capital among community members but more could be achieved by strengthening the fish club for overall community development. The community demonstrated a strong sense of collective actions. This community reported to have more frequent contact with various development agencies, in particular with group I&II and III members. People reported having been using services provided by all those and managed to establish good linkages. They were able to ask for assistance from the providers. All sections of the community members reported having access to credits. Both male and female members reported participating in activities for the improvement of households. These in turn foster social interactions and development of a society.

#### **Extension**

The overall aim of this approach is to enable farmers to participate and better utilize their resources, disseminate aquaculture information and overall fishers' community formations. MFVP is targeting all categories of farmers irrespective of wealth and gender.

This is a rich variety of sources of aquaculture information and other support facilities. Three

half day practical training for men and a half-day training for women have been organized in the community. There was a provision of one-day refresher training for farmers in the 2<sup>nd</sup> year. There was no provision of direct inputs, only training has been provided, but information was given on inputs availability and credits.

The role of extension officers is to enable community members in the process of learning and better utilise their own resources with existing capacity.

A large variety of extension methods were used during the process of implementation of the programme with less emphasis on individual counselling.

Few extension materials have been used during training and manuals and pond record book were provided to the farmers. This programme is cost effective in terms of numbers of farmer being contacted with in a short time period with limited manpower.

Viewing cost effectiveness and other efficacies this programme is being replicated nation wide by Fourth Fisheries project. Monitoring and evaluation is mostly controlled by the project, documented result sharing at the community level is poor. There was provision of adaptive research to improve effectiveness of the programme.

The overall aim of MFVP in terms of enabling farmers to participate and better utilise their resources, disseminate aquaculture information and overall fishers community formation has been achieved. The various actors involved

appeared to understand this well. A large number of external interventions are in place in this community and community members seem to have been efficiently utilising the services provided by them. People had been encouraged by the programme to search for options in finding better livelihood options. Aquaculture extension through the Model Fisheries Village Programme in this village seems able to sustain production.

A large numbers of other external interventions have reported been working in the community. People reported to be involved with these organisations and have indicted being good linkages and have been utilising services provided.

### **Poverty**

Groups I&II and III stated to have much greater choice than Group IV.

Only Group IV members reported to suffer from food deficit in 1999 for very short period. A few Group IV members indicated to eat a short meal during certain period of the year and Group IV had poorer diets compared to others but, in general, all groups reported eating a wide variety compared to other cases.

A large majority of the members used own tube well water for drinking. Only a few from Group IV reported to drink multi-owned tube well water. It is interesting to note that all community members were drinking tube well water either own or multi-owned.

There were a few pacca houses in the community. About half of the houses are made of tin roof and brick wall. There were some house built of tin roof and earthen wall. It is important to

note that there was no thatched house in this community. Changes in housing condition are positive in 1996 and 1999 among Groups I&II and III, in particular.

About half of the community members use latrine with katcha wall and slab as reported through the survey interviews. Some members reported to use pacca latrine as well. Some members stated to have no fixed place for solid waste disposal. There was a significant positive change in latrine usage trends among groups between 1996 and 1999 with group IV making highest improvement. The proportionate gap between I&II and IV is narrow.

Some people from Group I&II reported to suffer from cardiovascular disease which was not reported by other groups. On the contrary, a few people both men and women from Group IV reported to suffer from gastrointestinal disease, which was not common. Cold and aches are common problem among male of all groups. Few Group IV females also reported to suffer from dysentery where as Groups I&II and III reported of common cold and headache. Among all Groups children reported to suffer from worm among all groups and scabies in particular in Group IV informing poor hygiene. A few Group IV children reported to suffer from dysentery indicating poor sanitation.

The village doctor is common contact person for all groups of people. People from all groups reported visiting M.B.B.S in acute cases. Some of Group I&II and III members visited specialist too.

Male members from all Groups reported participating in Salish in 1999. But the number is highest among Group I & II. None from Group III reported to participate in local government or any clubs. Members from the same groups also reported to participate in school and puja committee. No female respondents reported taking part in Salish. About half from Group I & II members and some from Group IV members reported participating in local government organisations. None of the female members reported participating in local government and clubs. A large majority of females from Group IV reported adopting family planning techniques whereas it was about half in Group III and some in case of Groups I&II. There was a positive change in participation in Salish among Groups III and IV males between 1996 and 1999. But the number is much higher in Group I&II. There were no changes in female participation in Salish between years among various wealth groups.

Group I&II, III and IV female members reported to be involved in feeding, fertilisation but III&IV were also involved in stocking fingerlings. None of them reported being involved in pond construction; repairing; weeding; control of predators and fish harvesting & marketing. There were no remarkable changes in

participation on aquaculture between years.

There were no noticeable changes in decision making between male and females between 1996 and 1999 with a slight positive change in Group I&II. Group IV females perceive themselves having higher participation in decision making in various household activities compared to Group I&II and III between years.

A large majority of males were found to have formal education. A large majority had secondary level education. All pond owners reported to receive training in fish culture in 1996. A large majority of female members from Group I&II had formal education. A large majority of Groups III and IV members have at least signatory ability. There was no indication of female training among respondents. Group I&II replied that they did not attend because of other tasks. Both from Groups III&IV members reported that no one asked/did not get chance.

People reported having a large number of means of recreation among all groups. By and large, most community members are meeting their higher levels of needs.



**Table 4.9 : Village profile: NGO 1**

Sl.N <sup>o</sup>		1996	1999
1	Total Number of population	618	767
2	Total number of households	85	128
3	Average family member/ households	7	6
4	Average number of children/household	2	2
5	Total number of female headed household/ widow	20	30
6	Number of Primary School	1	1
7	Number of NGOs	2	2
8	Number of Mohila Samity	2	2
9	Number of Mosques	1	1
10	Number of Male club	0	0
11	Number of NGO School	1	0
12	Number of Temple	0	0
13	Number of Madrasha	0	0
14	Number of high school	0	0
15	Number of college	0	0
16	Number of health centre (GO and NGO)	0	0
Sources: Afizuddin, Kaliluddin, Yasin, Rafiqul, Mofizuddin			

**Table 4.10 CASE SUMMARY: NGO 1****Aquaculture**

There are 29 ponds out of which 18 are seasonal and 11 are perennial. Singly owned are 18 and 11 are multiple owning. The average water area of each pond was 15 decimals.

Physical condition of ponds such as embankment condition and watercolour were better in Group I&II compared to Groups III and IV. There was a significant difference in integration of dykes between Groups I&II and III and IV. Group III and IV reported that their dykes are narrow with incidental plantation by a few group IV members. No significant differences in physical condition between Groups I&II and III but Group IV is worse in embankment condition, watercolour and integration of dykes.

The community members reported ponds stocked with a total of 10 species of indigenous and exotic species. Stocking regimes are still higher among all groups than recommended by the NGO with up to a maximum of 120/ decimal.

Group I&II members mentioned buying fingerlings from local fry traders and village nurserer. Group III indicated buying from fry traders. Fry traders and nearby local nursery were stated by Group IV members. Stocking density among all groups was reasonably higher than recommended and was highest among Groups I&II and IV compared to Group III in between years. Species combination was fairly good.

A total of 9 different inputs were reported used by the respondents in the community. Uses of inputs were reported being applied mostly regularly by Groups I&II and IV. Cow dung is applied regularly by Groups I&II and IV, and on an irregular basis by Group III. All Groups used inorganic fertiliser and rice bran regularly. Mustard oilcake has been used by Groups I&II and IV members on an occasional basis. It is interesting to note that Group IV members reported using household wastes and termites as fish feed. The frequency and use of inputs was higher among Groups I&II and IV compared to

Group III. No changes of use and frequency of inputs among Groups I&II and III but the use of inputs was highest among Group IV in 1999.

The average fish production, as reported in 1996, was 5.83 kg/decimal and it stood at 8.20 kg/decimal in 1999. Fish production among all groups reported to increase in 1999. Female members from the same households also reported discussing with emphasizing mostly stocking and feeding fish by their male partners.

Fish consumption from natural sources declined by 50% and 25% in Groups III& IV respectively. Fish consumption from pond increased in by about 7% in Group III & by about 22% in Group IV. Consumption of fish from the market took a negative trend in Groups III and IV and decreased by 25% and 40% respectively. Only Group IV reported to receive fish as gifts but only

All groups reported to sell fish. Groups I & II reported selling fish at the local market and invest those incomes on agriculture activities. Groups III and IV indicated to sell fish at the pond site but reported to invest money on agriculture and house repairing and invested on buying foods and repairing rickshaws.

### **Social Development**

The proximity to local social services is moderate. The community has linked with a large number of organisations both from the government and the NGOs including commercial banks. RDRS has been working in this community for last couple of years and targeting poor and marginal farmers on a comprehensive development strategy. It was most active organisation and also acting as the main sources of information in this community. It must be mention that RDRS targets family rather than individuals. People reported to establish good linkage with institutions.

The key informants also commented of establishing linkages with organisations in particular, Group III and IV members.

The project co-ordinator (Fisheries) also mentioned of linking Department of women's affairs, Department of public health etc. He further added that group members have been privileged to get benefit such as IFADEP, WFP for pond excavations etc.

There are several sources of fisheries information such as the RDRS, local Upazilla Fisheries Office and the local fry traders. Fry traders also playing a role in disseminating fisheries information. The following agencies were found involved working in this community during 1996-99.

Informal networking and mutual support among community members was good. The establishment of hapa breeding programme and pond construction by IFADEP demonstrate best example of linking with various institutions. Trust, reciprocity and solidarity in the community are good. Community collected action reported well. Groups formed by NGOs have meetings quite regularly and have been building social capital including women. People's interactions to the team members were positive and very good. There was a positive shift in participation and decision making process and, in particular, females' participation and levels of decision making have been increasing. Females' role in decision-making and participation in income generating activities were good. Membership of institutions and organisation are limited to Group I & II. A few people indicated having access to safety nets such as government/NGO relief and rehabilitation programmes.

### **Extension**

The overall aim of the programme was to form groups from poor and marginal members of the community and increase fish production and overall livelihoods improvement of group members, in particular. The target group are the members of poor



and marginal section of the community including male and a greater emphasis on female members selection. Since this is a comprehensive approach, a large variety of information including health and education; sanitation etc has been offered to the group members.

Three-day centre based training was offered to the group members on aquaculture only. They also receive other skills and awareness training during the course of their membership. Group members are provided with credits.

The role of extension officers varied including transfer of technology to assist farmers in trying out new ideas.

A large variety of extension methods were used during the process of implementation of the programme with greater emphasis on pond and field visits. Few extension materials have been used and manuals and pond record book were provided to the group members. The programme is cost expensive compared to other extension programme. The processes of adaptive research have begun.

The overall aim of the RDRS programme was to form groups among poor and marginal farmers and increase fish production and overall livelihoods improvement of the Group members, in particular. Groups was formed and has reported been working well. There was an indication that a linkage is being formed with other external interventions between members of the community. The NGO covers a wide range of activities such as livestock rearing, nursery, education and health including advocacy for women's groups that indicate a comprehensive approach to development which thereby possess elements of 'social development.' The training provided to community members was put in to practice.

A few other external interventions reported utilising these groups established and have been providing services to the people. People's awareness to external intervention has increased and linkages have begun to be establishing to secure livelihoods.

### **Poverty**

Group I&II and III reported to had higher options in food item and indicated to eat expensive food items. The choice of food items is limited in Group IV who are mainly dependent on pulses and potatoes and cheaper vegetables. A few from Group III and IV reported food deficit in terms of having a short meal during up to 3 months at certain period of the year. Group IV women informed that they have food deficit while men have opposite reply.

All respondents were drinking tube well water in the community. A large majority of Group members from I&II and III reported drinking own tube well water but only a few from Group IV indicated drinking water from a multi-owned tube well. None reported to eat water from other sources such as pond or well water. It is important to note that all group improved drinking water condition but Group III members made most improvement.

There were no permanent pacca houses in this village. There were a few houses with tin roof and brick wall. Only a few houses were made up of tin roof and earthen wall. Thatched roof and earthen wall was the common housing pattern in this community. There had been slight improvement in housing condition among all groups but Group IV relatively made higher improvement.

There was no pacca latrine in this village. About half the people reported using katcha latrine with slab. Few of them indicated using katcha well. About half the people reported having no fixed place for waste disposal. There was a positive change on the

use of latrine between 1996 and 1999 among all groups but Groups IV made higher improvement than others.

Group I&II males reported suffering from upset stomach and common colds. Group III & IV members pointed out to suffer from gastric, body ache and cold. Females irrespective of wealth class reported suffering from gastric, headache. A few members from Group III reported to suffer from low blood pressure, Diarrhoea and dysentery was reported as a common disease for children in all groups indicating poorer sanitation. A Village doctor was reported as a common contact person for all. Interesting to note that some Group III and IV women reported that they are visiting hospital during health problems indicating their openness and willingness to utilise social services.

Groups I & II and III males reported to attend Salish. No one from Group IV pointed out to be involved in Salish. Females from any group did not take part in Salish. They reported the reasons as husband/society do not like it. Only one member from Group I&II reported being involved in local government organisation.

Again Groups I&II and III male members reported involved in school/mosque committee. None of female respondents reported to be involved neither in local government nor in any clubs. Rate of adoption of family planning methods was reported higher among Groups I&II and IV members.

There has been no change in women's participation in aquaculture in Group I&II. Group III and IV made improvements but highest made by Group III. There were positive and significant changes in participation in aquaculture among Group III and IV members. There were positive changes in women's decision making which was higher among Groups I&II and IV in particular.

Members from all groups reported to have formal education but the number was higher in group I&II than others. A few of Group I&II indicated to have secondary level education. This pattern is similar to female education. It is important to note that a vast majority of Groups III and IV female members achieved signatory ability in 1999. Some males irrespective of wealth groups reported to receive training from Department of agriculture, Department of fisheries and from RDRS. Female from Group I&II reported to have received no training at all. They further added that no one asked/did not get opportunity as a reason. A few from Groups III and IV reported to receive training from NGOs and has been attending meeting organised for females.

People from all groups reported having access to institutions and credits. Off-farm opportunities are moderate. Males and females are equally involved in income generating activities. On the whole, a large majority of the Community members meet basic needs to a minimum level.

A variety of analytical techniques as noted by Yin (1984, p.100) have been adopted to present the case evidences for actual analysis both in case description and in cross case comparison are listed below:

- Putting information in different arrays

- Making a matrix of categories and placing the evidence within such categories
- Visual data displays such as graphs
- Tabulation of frequency of events
- Examine the complexity of events and their relationships such as mean, percentage etc,
- Presenting information on chronological order

The following section describes how the raw data collected from the field were processed and the results were presented in case descriptions.

#### **4.1.1 AQUACULTURE**

As stated earlier in Chapter 3, data on aquaculture were collected through observational checklist, focus group discussion, interviewing key informants and through reviewing documents. These data were analysed using descriptive statistics such as variable frequencies and average and are illustrated below:

##### **Physical condition of ponds**

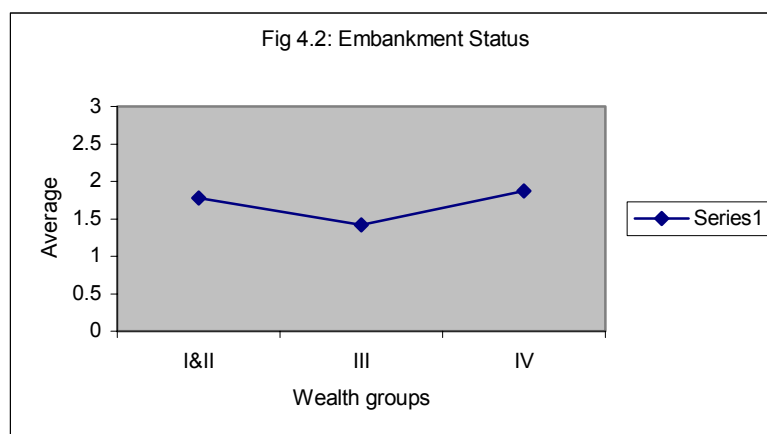
A structured checklist (**Appendix 4**) was used to collect data on the physical conditions of ponds. Individual checklists were coded case and wealth rank wise as shown below. It is important to note that each indicator was given a value of 1-2=*Low levels*; 3=*Medium levels* and 4-5=*High levels* and were observed and marked using ticks in favour of the quality against each pond. An **average** was calculated against each indicator as a measure of the physical condition of the pond according to wealth groups. Since the scoring on the checklist could only be an ordinal number, it was inevitable that a false degree of accuracy would emerge in the subsequent decimal values. For example, the averages for embankment status in Case 1 for Group I&II, III and IV was,  $25/14=1.78$ ,  $10/7=1.42$  and  $15/8=1.87$  respectively (**See Table 4.11 below**). However, to round these values up or

down would be to lose a sense of the relative differences. Therefore, the averages have been plotted as a Graph and were compared across wealth groups, whilst recognising that distortion, and are presented (see **Fig: 4.2**).

**Table 4.11: A Raw Data Sheet, Pond Observation, and Case 1**

Pond No	WR	Embn	AQweed	Wfish	Pscum	Wcolour	Dyke	Shade
1	I&II	3	3	3	1	2	1	3
5	I&II	1	1	2	1	2	1	1
6	I&II	2	2	2	1	2	1	1
7	I&II	1	3	1	1	1	1	1
11	I&II	2	3	1	2	2	1	2
12	I&II	1	1	1	1	1	1	1
13	I&II	2	2	3	1	1	2	1
14	I&II	3	3	3	3	3	1	3
15	I&II	1	2	1	3	2	1	1
18	I&II	2	3	2	1	2	1	3
19	I&II	2	3	2	2	3	2	2
20	I&II	1	3	2	1	3	1	2
21	I&II	2	2	3	1	2	1	2
29	I&II	2	3	3	1	2	1	2
		<b>1.78</b>	<b>2.42</b>	<b>2.07</b>	<b>1.42</b>	<b>2</b>	<b>1.14</b>	<b>1.78</b>
2	III	2	3	2	3	1	1	3
3	III	2	2	2	3	1	1	1
4	III	1	2	2	3	3	1	3
9	III	1	2	2	1	1	1	2
10	III	1	2	3	1	1	1	1
22	III	2	3	2	3	3	2	2
25	III	1	3	3	1	1	1	2
		<b>1.42</b>	2.42	2.28	2.14	1.57	1.14	2
8	IV	2	1	1	2	2	3	2
16	IV	2	2	1	1	1	1	2
17	IV	2	1	1	1	1	1	1
23	IV	2	3	1	1	2	1	2
24	IV	1	3	3	2	1	1	2
26	IV	2	2	2	1	1	1	2
27	IV	2	2	1	1	1	1	2
28	IV	2	2	1	1	1	1	2
		<b>1.87</b>	<b>2</b>	<b>1.37</b>	<b>1.25</b>	<b>1.25</b>	<b>1.25</b>	<b>1.87</b>

Similarly, other indicators such as Aquatic weeds; weed fish; pond scum; water colour; dyke integration and shading were calculated and presented in the same way at Case description level.



Data on the following aspects of Aquaculture were gathered through focus group discussion, document surveys and key informant interviews and the techniques adopted for data handling and analysing information are narrated below. The focus group questionnaire (**Appendix 6**) was coded case wise and also wealth group wise.

### Use of inputs

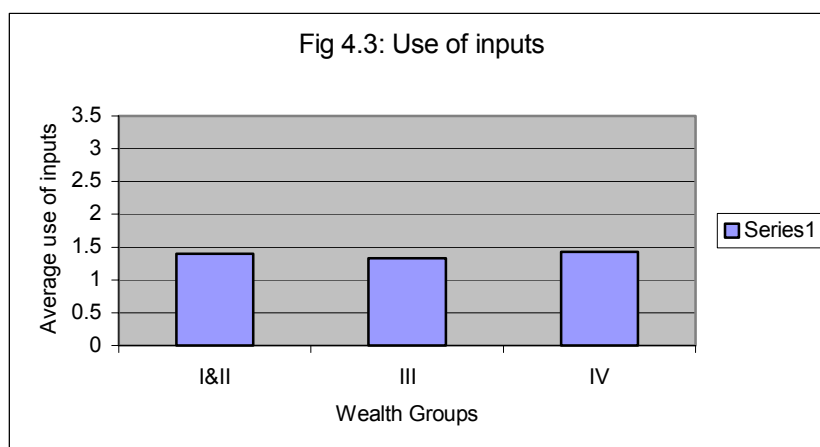
Using descriptive statistics, an **average** was calculated by adding the sum of total number of observed frequency (weight of number of input use) divided by the sum of total number of input use across wealth groups for individual case description and was presented visually using graphs. (A total of 10 inputs were listed. The frequency of use of inputs were given a weight as, *regularly used* = 3, *irregularly used* = 2 and *seldom* = 1). Weighting is done since the frequency of use inputs determine the outcome of applying inputs. The following example includes a raw data sheet and an explanation of how the raw data was handles as follows:

**Table 4.12: Raw data Sheet: Use of Inputs, 1999, Group I&II Case 1**

Inputs used	Regularly used	Irregularly used	Seldom used
Cow dung			✓
Rice bran	✓		
Lime			✓
Oil cake			✓
Inorganic fertiliser			✓
	1 x 3 = 3	0 x 2 = 0	4 x 1 = 4

Total = 7 from 5 returns. Therefore the average =  $7/5 = 1.4$

This, together with similar data for other groups was then presented graphically:

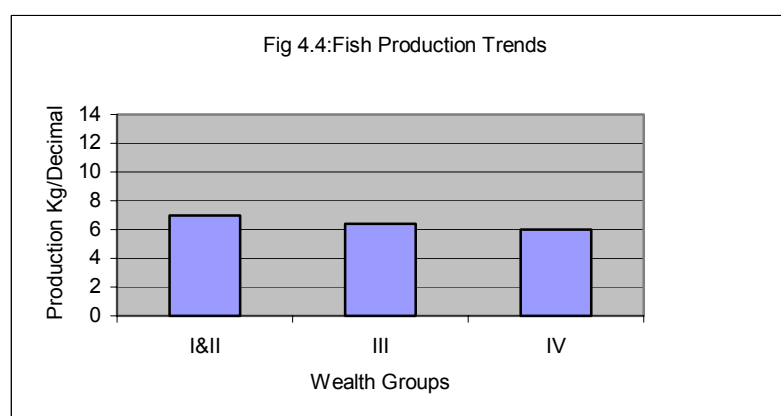


### Fish Production and Stocking of Fish Species

Fish production was expressed at **kg/decimal** and was calculated according to wealth Group categories at case levels. It was decided that only 1999 production will be presented but a comparison between years has been detailed in case descriptions. For example, fish production for Group IV, Case 1 was 5.28 and 6 Kg/decimal in 1996 and in 1999 respectively.

**Table 4.13: Raw data sheet: Fish Production, Group IV Case 1**

Fish production (Kg/Decimal) 1996	Fish production (Kg/Decimal) 1999
5.28	7



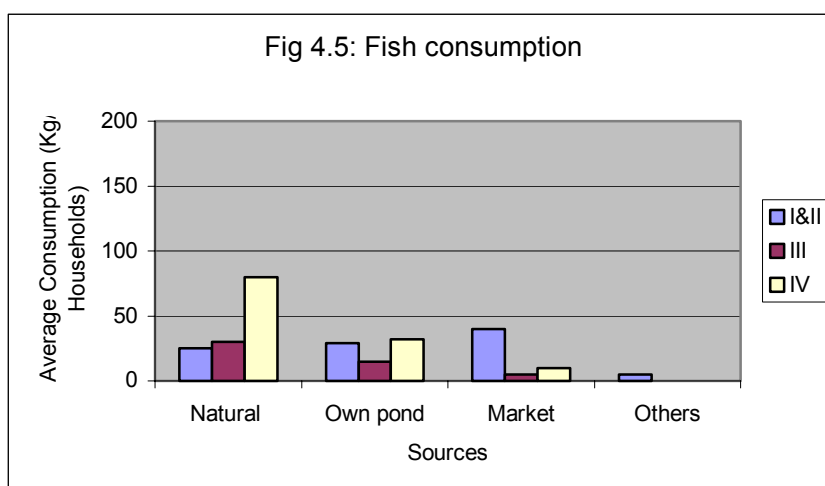
Stocking of Fish Species was calculated using similar techniques and was expressed as **number per decimal** in Case descriptions.

## Fish consumption

Fish consumption was calculated at **kg/households** on the basis of sources (natural, own pond, market and others) and was calculated according to various wealth categories between years at case levels. The pattern and trend of 1999 were expressed in visual presentation as graph. In addition, the trends of consumption between years were expressed in percentage of increment or decrease in case descriptions.

**Table 4.14: Raw data: Fish Consumption Group IV, Case 1**

Consumption	Natural sources	Pond	Market	Others
1996	100	20	10	0
1999	80	32	10	0



## Fish sales

Fish sales were calculated as **percentage** of number of farmers who sold fish according to various wealth groups at case levels and has been presented in table, For example,  $3/6=50$ ,  $6/6=100$ ,  $4/6=67$ . For example, see **Table 4.15** for fish sales in Case 4.

**Table 4.15: Fish sales, Case 4**

Wealth category	I&II	III	IV
% Of Farmer sold fish, N= 18)	3/6	6/6	4/6

## 4.1.2 SOCIAL DEVELOPMENT

Data on various aspects of social development were collected through person reflections using field notebooks, structured questionnaires and through using documentary evidence.

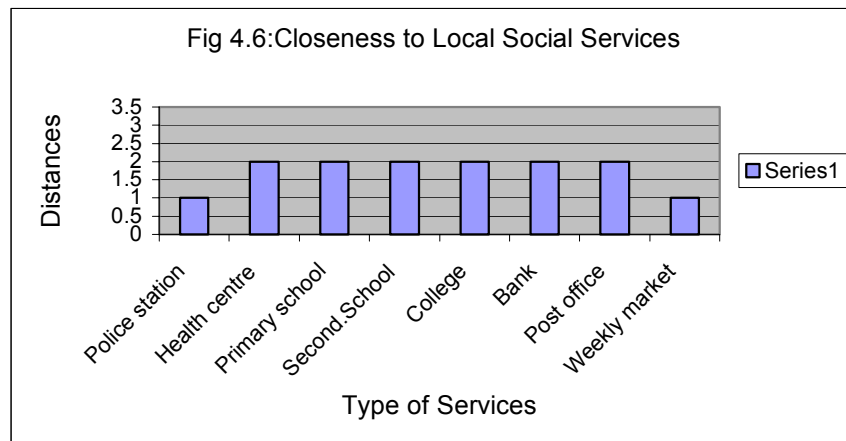
These data has been analysed using descriptive statistics such as **average, proportions and as explanatory comparable statements**, which are explained below.

#### Closeness to Local Social Services

A list of eight different institutions which are common in the study area context, such to Police Station; Health Centre; Primary School; Secondary School; College; Bank; Post Office; Weekly Market and their closeness to the community was recorded as nominal data in distances as kilometres. Following a scale on the basis of closeness to the community, for example, the scale  $0-2\text{ km}=3$ ,  $3-5\text{ km}=2$  and  $>5\text{ km}=1$  was allocated. The following scores, as the number representing distance, were presented at case levels by using graphs (See Fig: 4.6). For example the closeness to local social services for Case 1 are as follows:

**Table 4.16: Raw data: Closeness to Local Social Services, Case 1**

Cases	Police station	Health Centre	Primary School	Secondary School	College	Bank	Post Office	Weekly Market
Case 1	1	2	2	2	2	2	2	1
Case 2								
Case 3								
Case 4								
Case 5								



#### Social Capital

Social capital across communities was assessed through survey questionnaire (**Appendix 7**) following a **Likert Scale**. Data handling for social capital is illustrated below. The responses from individual questionnaires were transformed into a summary sheet and are presented below. The quantitative responses as opinion were categorised as proportions



such as “*all*”, “*a large majority*”, “*about half*”, “*some*”, “*a few*” and “*none*” for explanations at community level and are presented below. Perceptions and opinions of key informants were also incorporated as explanations at case levels.

### **Raw data Synthesis: Summary Sheet for Social Capital: Case 1,**

#### **Q. Mutual trust and Solidarity**

If any disaster (crop, livestock, fish) hit your community who do you think would deal with the situation? Please put a tick (✓) against your opinion and make comments as necessary.

The entire village	[✓]
Every one would deal individually	[✓✓✓✓✓✓✓✓✓✓]
Do not know	[ ]
Others	[ ]

**Summary: A large majority-----**

#### **Q. Collective Action**

In last five years, did you organise orphan marriage/medical treatment for helpless collectively in the village? Please put a tick (✓) against your opinion and make comments as necessary.

Yes	[ ]
No	[✓✓✓✓✓✓✓✓✓✓]
Do not need	[ ]
Do not think about it	[ ]

**Summary: All -----**

#### **Q.Trust**

Suppose you/any one in the village need to stay outside the village for any reason, who do you think will look after your/others house and other assets? Please put a tick (✓) against your opinion and make comments as necessary.

Only blood relatives (Gusti)	[ ✓✓✓✓✓✓✓✓✓✓ ]
Village friends	[ ]
Any one from the village	[ ]
Some one outsider	[ ]

**Summary: All-----**

This was expressed in qualitative terms as explanations and are presented below:

When respondents were asked about informal networking and mutual support **a large majority (7 - 9 out of 10 responses)** reported individualism.

In a response to solidarity for example of thinking about overall village development **a large majority (7 - 9 out of 10 responses)** voted in favour of being self-centred, where very few of responded being in favour of community level development.

- When asked if there was someone who thinks unprompted about community level development, **a large majority** indicated that there are no such people in the community.
- When asked about trust, whether only close relatives can be trusted or a wider group of villagers, **all** replied (**10 out of 10 response**) in favour of trusting close relatives (gusti) and neighbours only. In a similar question to resolve disputes between neighbours, **a large majority** trusted local leaders and **a few (less than 2 out of 10 responses)** trusted neighbours.
- When asked what they do if the young misbehaved with the elderly or do bad activities, **some (2 - 4 out of 10 responses)** trusted close relatives and neighbours to resolve such problems.
- When asked about collective action in the last five years **all** responded that there was no evidence of such collective action.

The **key informants** from the community reported the prevalence of self-centred thinking, disbelieve, mistrust between community members. They also reported social conflicts between households and between ethnic groups.

#### **4.1.3 EXTENSION**

Data on various aspects of extension methodology were collected through structured questionnaire, interviewing key informants and through reviewing documents. Data gathered through the questionnaires has been coded and analysed using descriptive statistics such as the average and through making explanatory, comparable statements. Data collected through interviews were recorded and transcripts of each interview were prepared for study and incorporated as **comparable statements and quotes** as necessary. Data

collected from documentary evidence has been used either to support or disprove data collected from other sources and are also quoted as appropriate.

**For example, the aims and objectives of Case 4 have been described below:**

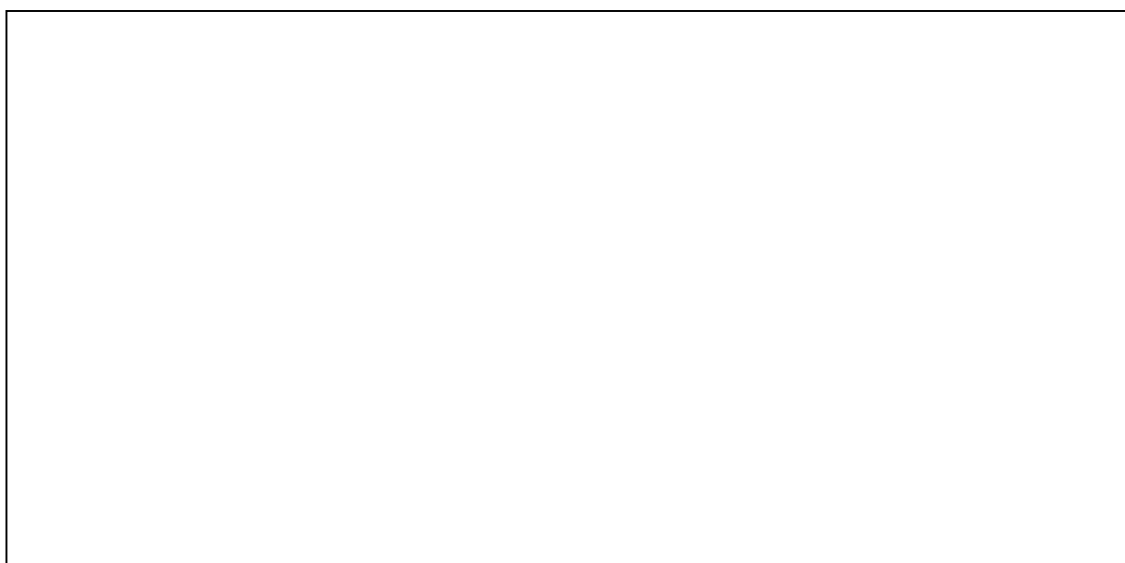
Data gathered from extension providers is presented in **Table 4.17 below** and data gathered from key informants and document reviews are explained and quoted as and where ever appropriate.

- When UFO/NFEP extension officers were asked through structured questionnaire about the aim of Model fisheries village programme all reported that this approach not only disseminates fish culture information but also has elements for overall village development.

**Table 4.17: Objectives of programme, Case 4**

	Number of reply
Increase fish production	0
Teach improved fish culture techniques	0
Teach and disseminate improved techniques	0
To increase fish production, disseminate and overall village development	3

- When asked in a semi-structured interview the extension managers responded in the same way and also stated that income generation; protein supply and creation of employment opportunities and poverty reduction. They also added the formation of fish farming groups in the community for enhancing collective action in the future.



### Data as a quotation from Key informant interviews

It is interesting to note that one key informants: the TCO team leader replied that *'the actual objective of MFVP is enabling community and individuals to actually exercise options that were not known to them in the past'*. Answering the same question one key informant reported that *'the MFVP increase fish production for all, extend aquaculture technologies to neighbours and overall village development'*.

Similarly, data on the following aspects of Extension Methodology was explained and presented in case descriptions:

- The aims and objectives of the programme
- Targeting
- Variety of information
- Training arrangements
- Input supply mechanism
- Role of extension officer
- Participation at various levels of the programme
- Cost effectiveness of the programme
- Monitoring and evaluation of programme
- Provision of adaptive trial

Data on the use of extension methods and extension materials has been categorised using a Likert Scale and a weighted total of frequencies was calculated, as illustrated below:

#### *Use of extension methods*

Using descriptive statistics, a **weighted total** was calculated by adding the sum of the number of observations, weighted by frequency (The frequency of use of methods were given a weight according to Likert's ordinal scale as *Very often* =4, *Often* =3, *Quite often* =2, *Seldom* =1 and *Never used* =0). The weighted total was then presented in case description using graphs.

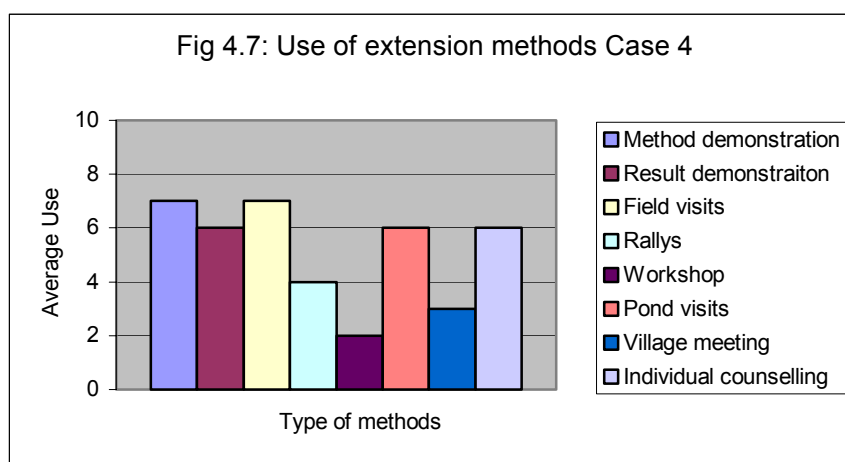
**Table 4.18: Raw data: Use of Extension Methods, Case 4**

	Very often	Often	Quite often	Seldom	Never used	<b>Weighted Total</b>
Method demonstration	0	1	2	0	0	<b>7</b>
Result demonstration	0	0	3	0	0	<b>6</b>
Field visit	0	1	2	0	0	<b>7</b>

	Very often	Often	Quite often	Seldom	Never used	Weighted Total
Farmers' day rallies	0	0	1	2	0	4
Workshop	0	0	0	2	0	2
Pond visit	0	0	3	0	0	6
Village meeting	0	0	0	3	0	3
Individual counseling	1	0	0	2	0	6

The **weighted totals** plotted against each method used are shown in the graph (Fig. 4.7)

below:



Similarly, the use of extension materials was also analysed and presented.

#### 4.1.4 POVERTY

Data on poverty was gathered through a Household survey questionnaire (See **Appendix 1**); Focus group discussions (See **Appendix 6**); and Key informant interviews (See **Appendix 8**). The household survey questionnaire was coded and processed using Microsoft Access. The focus group discussion questionnaire was coded case wise and wealth group wise and the findings were summarised in a table format. Data gathered on various aspects of poverty was coded and incorporated as explanations/statements in describing cases. Data on poverty issues have been analysed using descriptive statistics, such as, **mean; proportions; percentage; ratio** and by deriving **explanatory comparable statements**. A summary of processing of data and data presentation are highlighted below.

**Data collected can be grouped into the following categories:**

Data gathered through focus group discussions were coded case wise and wealth rank wise. The findings were summarised as a set of brief sentences or “**statements**” (Miles & Huberman, 1994) at case level. The statements were then ranked at cross-case level to make comparisons since, as Miles & Huberman (1994, p178) said, ‘*cross case data need to be made comparable via common codes, common displays of commonly coded data segments and common reporting formats for each case*’. An example of such summary of statements is cited below. Moreover, data collected from key informants has been coded and incorporated as explanations in the case descriptions.

**Food levels**

Data were collected on food consumption by focus group discussion using the following grid (See **Table 4.19**) and supplementary explanations were written up as descriptive explanations (Miles and Huberman, 1994) at case level and are presented below:

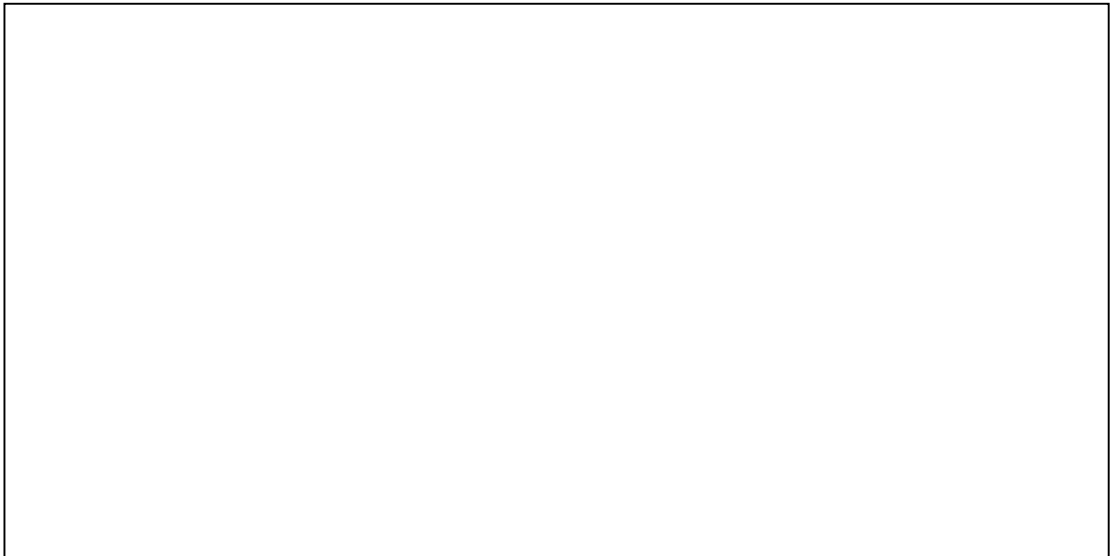
**Table 4.19: Food levels, Case 4**

Year	1996	1999	1996	1999	1996	1999
Wealth groups	I & II	I & II	III	III	IV	IV
Food deficit	y/n	y/n	y/n	y/n	y/n	y/n
y = Yes n = No	n	n	n	n	n	n



### **Common disease and Medical preferences**

Data on health and disease were collected through focus group interviews with various wealth groups including females in the community. Data collected from various wealth groups (male and female) through focus group discussion were displayed as explanations (Miles & Huberman, 1994) at case level. Information gathered from key informants were also incorporated as explanations or statements. For example, the common health and medical preferences in Case 4 have been explained as follows:



Similarly data on means of recreation; coping in crisis and mobility has been analysed and presented in Case descriptions.

### **Latrine Usage Trends**

Data was gathered through structured survey questionnaire. The techniques followed to synthesize data on the above are explained below:

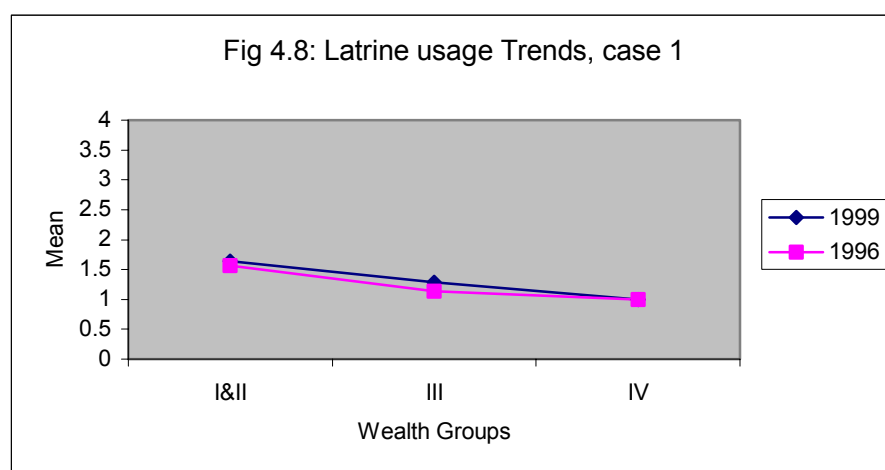
The Use of Latrines was calculated using descriptive statistics as an **average score** which can be expressed as sum of the product of the frequencies divided by the sum of total observations, based upon the quality of latrine Pacca =4, *Katch well with slab*=3,

*Katcha/Well=2 and No fixed place=1*. The average was calculated, for example total number of returns divided by number of observed frequencies, therefore the average, in this case  $23/14 = 1.64$  for 1999 and  $22/14 = 1.57$  for 1996 (with the same caveat as expressed in section 4.1.1). The average was compared between 1996 and 1999 according to wealth categories in order to establish trends. Moreover, data collected through key informants has been coded and incorporated as explanations (Miles and Huberman, 1994) in the case descriptions.

**Table 4.20: Raw Data Sheet: Latrine usage, Group I&II, Case 1**

Type of latrine	Weight	1999		1996	
		I&II	Score	I&II	
Pacca	4	0	0	0	0
Katcha well with slab	3	4	12	3	9
Katcha/Well	2	1	2	2	4
No fixed place	1	9	9	9	9
<b>Total</b>		<b>14</b>	<b>23/14=1.64</b>	<b>14</b>	<b>22/14=1.57</b>

In the same way, data from the other two wealth groups was analysed to calculate an average for each wealth group across cases (See Fig. 4.8).



The degree of improvements in latrine for Group I&II between years was also calculated as for example,  $\text{Mean 1999} - \text{Mean 1996} = \text{Degree of improvement}$ , for example, in this case,  $1.67 - 1.57 = 0.07$ .



Similarly, data on Housing and Drinking Water situation was analysed and presented in Case descriptions.

### Participation in Aquaculture

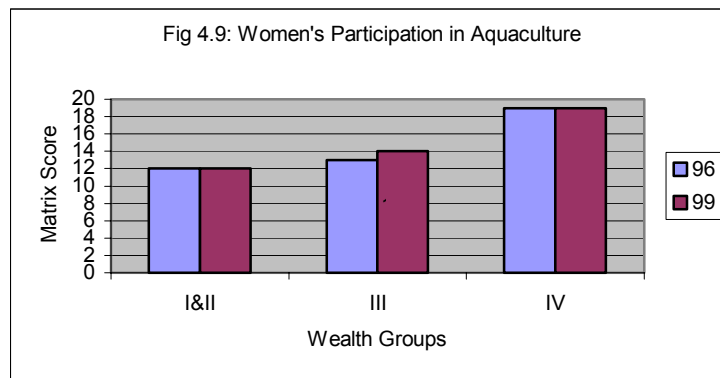
Data was gathered through focus group discussion, key informant interviews and document surveys.

Data collected using matrix-scoring exercise (PRA tools), where participation in various aspects was given a score of 0-10 as **ratio/proportions** where 0 = *No participation* and 10 = *Highest participation* in activities. **Total scores** were calculated by summing scores for men and women and according to wealth category at case level and are presented using graphs. In addition, other supplementary information derived from focus group discussion, key information interviews and document reviewing has been presented as explanation and quotations as appropriate are presented below:

**Table 4.21: Raw data: Women's Participation in Aquaculture: Group I&II, Case 4**

Activities	1996		1999	
	Men	Women	Men	Women
Pond construction/re-construction & repair	10	0	10	0
Drying out	10	0	10	0
Weed control/predatory fish control/poisoning	10	0	10	0
Liming	10	0	10	0
Fingerling purchase	8	2	8	2
Fingerling stocking	5	5	5	5
Feed/fertilisation applying	5	5	5	5
Fish marketing	10	0	10	0
<b>Total Score</b>	<b>68</b>	<b>12</b>	<b>68</b>	<b>12</b>

For example, the total scores for Groups I&II, Case 4 were 12 in 1996 and 12 in 1999 respectively and plotted as in Figure 4.9.



In addition the following points were summarised as explanatory statements

#### Notes taken during focus group discussion

Groups I&II, III and IV female members reported to be involved in feeding, fertilisation but III&IV were also involved in stocking fingerlings. None of them reported to be involved in pond construction; repairing; weeding; control of predators and fish harvesting or marketing. There were no remarkable changes in participation on aquaculture between years. In general, Groups IV and III had higher participation on aquaculture activities. It is important to note that only some Group IV members reported exchanging ideas on fish culture with others.

#### Data derived from documents has been quoted for example as follows.

Eggen (1999) stated that '*participation of women and children on aquaculture in model fisheries villages has been increasing*'.

Data on Women's Decision making was analysed and presented in Case descriptions in exactly the similar way as mentioned above.

#### Memberships and Representation

Data was collected from focus group discussions as numbers participating in various activities and were summarised using descriptive statistics **as percentages** of participation.

For example, data collected on memberships and representation by Case 4 members are presented in Table 4.22 below:

**Table 4.22: Raw Data, Memberships and Representation, Case 4**

Participation (N=18)	1996	1999	1996	1999	1996	1999
	I & II	I & II	III	III	IV	IV
Shalish (number)	0	5	0	1	0	1
Local Govt (number)	4	4	0	0	2	2
School, Mosque etc (number)	4	5	6	6	4	4
Children by Choice (number)	3	3	3	3	5	5

Male members from all Groups reported participating in Salish in 1999. But the number was highest among Groups I & II. None from Group III reported participating in local government or any clubs. Members from the same groups also reported participating in school and puja committee.

No female respondents reported taking part in Salish. About half from Groups I & II members and some from Group IV members reported participating in local government organisations. None of the female members reported participating in local government and clubs.

A large majority of females from Group IV reported adopting family planning techniques whereas the proportions reported for Groups III and I&II were about half and some respectively.

Similarly, data on Education and Training was analysed and presented in Case descriptions.

### **Access to credit**

Data was gathered through focus group discussion analysed using descriptive statistics.

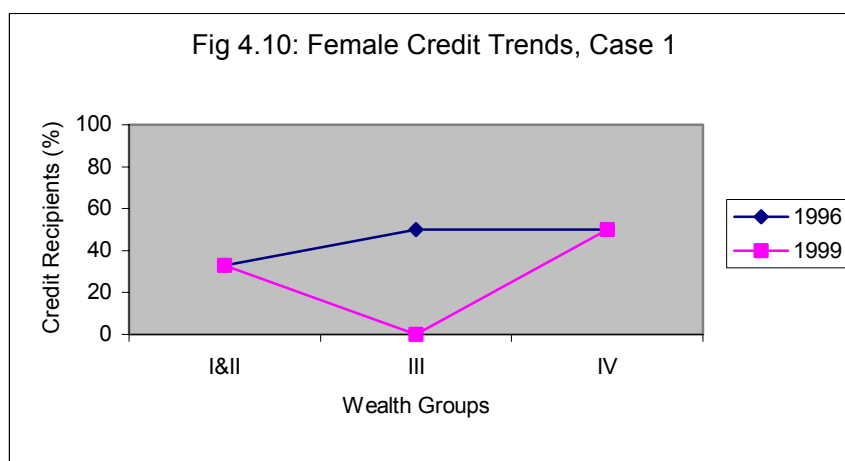
Data collected by key informant interviews has been recorded and presented as explanations or comparable statements.

Access to credit was calculated following descriptive statistics as **percentage (%)** according to various wealth groups and comparison were made at case levels between 1996 and 1999 in both male and females and were presented graphically.

For Example, the credit recipients in Case 1 Females in 1996 and 1999 are presented in Table 4.23, and Fig. 4.10 below:

**Table 4.23: Raw data Female credit recipients in Case 1**

Year	I&II	III	IV
1996	33	50	50
1999	33	0	50



Similarly, data on credit in other Groups and Cases were analysed and presented in Case descriptions.

## 4.2 Cross Case Comparison (Case Ordering/Ranking)

In this section, I will explain how the data from the case descriptions were handled to generate “comparative explanations” or cross-case comparisons, what Yin (1984) has called “rival explanations”, (process B in figure 4.1) and to look for consistent patterns from which some explanatory significance can be drawn from a specified set of comparisons (Mason, 1996). Miles & Huberman (1994) suggested two reasons for cross case comparisons as noted below:

- To enhance generalizability
- To deepen understanding and explanations

Moreover, the use of multiple case studies has been reported as advantageous (Yin, 1984; Stake, 1995). In mentioning advantages, Miles & Huberman (1994, p.173) cited that *‘multiple cases not only pin down the specific conditions under which findings will occur but also help us form the more general categories of how these conditions may be related’*. Again, Yin (1984, p.48) opined that *‘the evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust’*.

### 4.2.1 AQUACULTURE

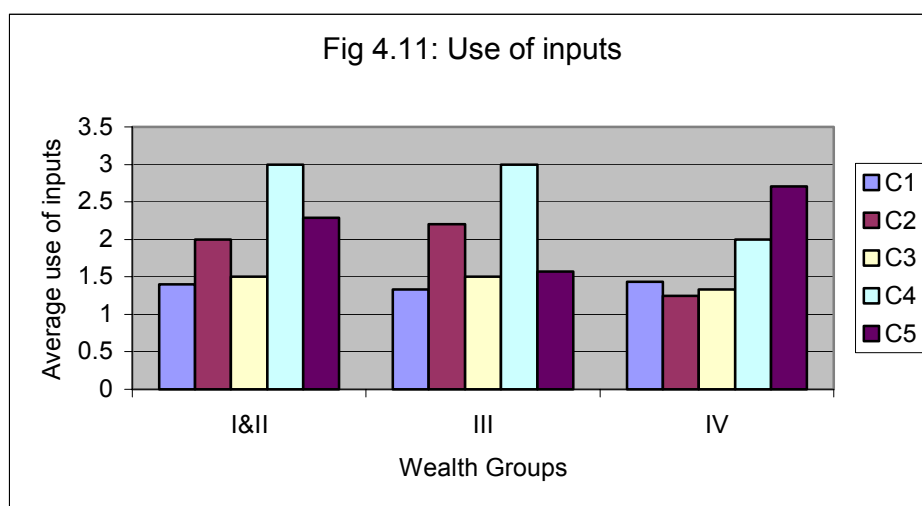
The summary statements generated at the case level were used to make comparisons at the cross case level since Miles & Huberman (1994, p. 178) *‘cross case data need to be made comparable via common codes, common displays of commonly coded data segments and common reporting formats for each case’*.

In section 4.1 the Aquaculture status of each study village has been represented based upon criteria laid out in each case description. Clearly there was too much data to compare directly, and so a digest had to be prepared. A brief description of the process used to summarise those

criteria for cross case comparison and eventually for reaching a rank position on overall aquaculture status for each case has been presented below:

### Use of inputs

Since there was no discernable pattern between groups (See Fig. 4.11) for this indicator a collation of data for all wealth groups was used for each case.



Thus an average value for the use of inputs was calculated for each case by amalgamating the average respondent use of inputs for all 3-wealth groups. For example, the average respondent use of inputs in Case 1, was for Group I&II = 1.4, for Group III = 1.33 and for Group IV was 1.43 (See earlier caveats about levels of accuracy), therefore the **average** becomes  $1.4+1.33+1.43 = 4.16/3$  or **1.39**. Values for each of such averages for all five cases are then plotted in a graph (See Fig. 5.1).

In a similar way, the other 5 parameters (physical condition of ponds; Stocking; Fish production; Fish consumption and Sale trends) were analysed using average values for cross case comparison to eventually reach a final rank/order for overall aquaculture status against each case as presented below:

### Physical condition of ponds

A total score was calculated against each indicator, and then an average value was calculated of the weighted score of all ponds. For example, the weighted total of Case 1 ponds was  $341/28=12$ . The mean value of other 4 cases was analysed similarly. The average of **Case 2=14, Case 3=13, Case 4=16, Case=11** respectively. And these average values were plotted in a graph (See Fig. 5.2) and compared across cases.

**Table 4.24: Observation of Pond Quality, Case 1**

Pond No	WR	Embn	AQweed	Wfish	Pscum	Wcolour	Dyke	Shade	Weighted Score
1	1	3	3	3	1	2	1	3	16
2	3	2	3	2	3	1	1	3	15
3	3	2	2	2	3	1	1	1	12
4	3	1	2	2	3	3	1	3	15
5	1	1	1	2	1	2	1	1	9
6	1	2	2	2	1	2	1	1	11
7	1	1	3	1	1	1	1	1	9
8	4	2	1	1	2	2	3	2	13
9	3	1	2	2	1	1	1	2	10
10	3	1	2	3	1	1	1	1	10
11	1	2	3	1	2	2	1	2	13
12	1	1	1	1	1	1	1	1	7
13	1	2	2	3	1	1	2	1	12
14	1	3	3	3	3	3	1	3	19
15	1	1	2	1	3	2	1	1	11
16	4	2	2	1	1	1	1	2	10
17	4	2	1	1	1	1	1	1	8
18	1	2	3	2	1	2	1	3	14
19	1	2	3	2	2	3	2	2	16
20	1	1	3	2	1	3	1	2	13
21	1	2	2	3	1	2	1	2	13
22	3	2	3	2	3	3	2	2	17
23	4	2	3	1	1	2	1	2	12
24	4	1	3	3	2	1	1	2	13
25	3	1	3	3	1	1	1	2	12
26	4	2	2	2	1	1	1	2	11
27	4	2	2	1	1	1	1	2	10
28	4	2	2	1	1	1	1	2	10
<b>Total Score and Average</b>									<b>341/28=12</b>

### Fingerling stocking pattern

Stocking fingerlings among all cases were higher than recommended by any extension approach. Comparing modest stocking across cases, Case 4 was found to have stocked least followed by a slightly higher level in Case 2. The selection and combination of fish species among all groups were better in Case 4. There were no remarkable differences in stocking density between Case 1, Case 3 and Case 5 but these were high compared to Case 4, in particular. Table below summaries the fingerling stocking pattern across cases. For example,

**Table 4.25: Fingerling Stocking, 1999**  
(number per decimal)

	I&II	III	IV	Average
C1	118	107	99	<b>108</b>
C2	89	110	77	<b>92</b>
C3	99	105	112	<b>105</b>
C4	71	76	89	<b>78</b>
C5	120	91	105	<b>105</b>

### Fish production

Average fish production was calculated by adding fish production of all groups for example, the fish production of Case 1 amongst Groups were 7, 6.4 and 6 kg/decimal respectively, therefore, the average fish production for Case 1,  $7+6.4+6=19.4/3=$  **6.47 Kg/decimal**. Table 4.26 below summarises the fish production across cases and these averages are then plotted in a graph (See Fig. 5.5).

**Table 4.26: Fish Production 1999**  
(kg. per decimal)

Cases	I&II	III	IV	Average
<b>C1</b>	<b>7</b>	<b>6.4</b>	<b>6</b>	<b>6.47</b>
C2	8	7.9	6.4	7.5
C3	7	6.9	6.4	6.77
C4	12	11.3	8.5	10.67
C5	9	8.4	7	8.2



### Fish consumptions from pond

Mean fish consumption was calculated by summing the average total fish consumption amongst all groups for example, the fish consumption from pond of Case 4 between Groups were 173, 100 and 92 kg/household respectively, therefore, the mean fish consumption amongst Groups in Case4,  $173+100+92=365/3=121.67=122$  Kg/household (See Fig 5.6 ).

**Table 4.27: Fish consumption  
(kg. per household, per year)**

Cases	I&II	III	IV	Average
C1	29	15	32	26
C2	65	30	15	37
C3	63	32	35	44
C4	173	100	92	<b>122</b>
C5	45	32	28	35

### Fish Sale Trends

Fish sales have been presented as numbers of people who had reported selling fish. Average sales were calculated by adding the average total numbers of farmers who had sold fish amongst all groups. For example, the percentage of numbers of farmers who sold fish in Case 4 amongst all Groups were and  $3/6=50$ ,  $6/6=100$  and  $4/6=67$  % respectively, therefore, the average fish sale in Case 4,  $50+100+67=217/3=72.2\%$  (See Fig 5.7 ).

**Table 4.28: Fish sales**

Wealth category	I&II	III	IV
% of farmers who sold fish, N= 18)	50 % 3 out of 6=3	100% 6 out of 6=6	67% 4 out of 6=4

### Summary of overall Aquaculture Status

On the basis of the patterns and trends emerged for 6 parameters in the cross case comparison, a rank/ score of 1-5 can be given for that each parameter, where 1 represents worst case and 5

represent best case situation, to eventually reach what Miles and Huberman (1994) suggested as Case Rank/Ordering for overall aquaculture status of the five Cases. This is presented in Table 4.29.

**Table 4.29: Summary of Aquaculture Status**

<i>Parameters</i>	<i>CASE 1</i>	<i>CASE 2</i>	<i>CASE 3</i>	<i>CASE 4</i>	<i>CASE 5</i>
Physical conditions	2.5	4	2.5	5	1
Stocking	2	4	2	5	2
Input use	1.5	3	1.5	5	4
Fish production	1	3	2	5	4
Fish consumption	1	2.5	4	5	2.5
Marketing and distribution	3	1	2	5	4
<b>Total Weighted Score</b>	<b>11</b>	<b>17.5</b>	<b>14</b>	<b>30</b>	<b>17.5</b>

#### **4.2.2 SOCIAL DEVELOPMENT**

Data were collected on social structures through focus group discussion, structured questionnaire and key informant interviews as mentioned in Chapter 3. Miles & Huberman (1994) suggested that such information be summarised as a set of brief sentences as “statements” at case levels against each subsection for cross case comparison.

Afterwards, the “ summary statements” against each parameter derived from individual case description were compared and **ranked/ordered** across cases (Miles & Huberman, 1994) to reach a rank position on overall social development status of the cases.

##### **Social Structures**

These include Government primary school; NGO primary school; High school; College and Health centres/ Clinic and given a **score of 4** due to their higher efficacies in community development and community well being. Credit groups both male and females were given a

**score of 3** for their income generation role and livelihoods impacts. Village clubs **scored 2** and Mosques and Temples was given a **score 1**. On the basis of the weighting given above the average scores for social structures are set out in Table 4.30 and presented in Figure 5.9.

As an example let us take Social Structures in Case 1 and present them below:

**Table 4.30: Raw Data sheet: Social Structures, Case 1**

<b>Social structures</b>	<b>Yes/No</b>	<b>Value/Score</b>
Govt.Primary School	✓	4x1=4
NGO Primary School	0	
High school/Madrassa	0	
Colleges	0	
Health Centre/Clinic	0	
Female Credit Group	✓	3x1=3
Male Credit Group	0	
Village Club	0	
Mosque	0	
Temple	✓	1x1=1
<b>Total (10)</b>		<b>8</b>

The total score was 8 from a possible 10 observations, therefore, the **average** for Social Structures in Case 1 was  $8/10=0.80$ . Similarly, averages for other villages were calculated for Case 2  $14/10=1.4$ , for Case 3  $22/10=2.2$  for Case 4  $18/10=1.8$  for Case 5  $13/10=1.3$  respectively (See Case descriptions 1-5). The averages were then plotted in a graph and are shown in Fig. 5.9

The overall social structures have been presented as mean values as stated above and **were then ranked as**

**1.....Case 1 = 1; Case 5 = 2; Case 2 = 3; Case 4 = 4 and Case 3 = 5**

#### **Closeness to Local Social Services**

A list of institutions such as closeness to police station; health centre; primary school; secondary school; college; bank; post office and weekly market was made. Following a scale

of 0-2 Km=3, 3-5 Km=2 and >5 Km=1 scores were distributed. On this basis an average for access was calculated and presented at case levels and a weighted total was calculated and presented for cross case comparison. For example, this was expressed as “high social structure”; “moderate social structure” and “low social structure” for case ranking/ordering

**Table 4.31: A Raw data Sheet: Closeness to local social services, Case 1**

Cases	Police station	Health Centre	Primary School	Secondary School	College	Bank	Post Office	Weekly Market	Total Weighted Score
Case 1	1	2	2	2	2	2	2	1	<b>14</b>
Case 2	2	2	2	2	2	2	2	2	<b>16</b>
Case 3	1	3	3	2	2	2	3	1	<b>17</b>
Case 4	1	1	2	2	1	1	1	2	<b>11</b>
Case 5	1	2	2	2	1	2	2	2	<b>14</b>

All the scores given against each institution have been added up to find a total weighted score and the total weighted score was plotted and presented in Fig. 5.11.and compared across cases.

Thus the cases can be ranked/ordered as follows

**2..... Case 1= 2.5; Case 2 = 4.5; Case 3 = 4.5; Case 4 = 1; Case 5 = 2.5**

### **Social capital**

Social capital across communities was assessed on the basis of mutual support and networking; solidarity and reciprocity among community members. This method was adapted from a community social capital study in Rajasthan, by Krishna & Uphoff (1999). A summary for each case was built up from the individual case descriptions, and ranked below. The data collected at case level follow a Likert scale and are expressed **in proportions**. A summary was made for cross case comparison as “statement” (Miles & Huberman, 1994). For example, the following explanations were made from the raw data for Case 1, as follows:

**Data**

Q. Mutual trust: If any disaster (crop livestock, fish) hit your community who do you think deal with the situation. Please put a tick against your opinion and make necessary comments

The entire village	[ ✓ ]
Every one would deal individually	
[ ✓✓✓✓✓✓✓✓ ] Do not need	
[   ]	
Others	[   ]

Other comments:

**Summary: Almost all**

**Q. Collective Action**

In last five years, did you organise orphan marriage/medical treatment for helpless collectively in the village? Please put a tick (✓) against your opinion and make comments as necessary.

Yes	[   ]
No	[ ✓✓✓✓✓✓✓✓✓✓ ]
Do not need	[   ]
Do not think about it	[   ]

Other comments:

**Summary: All**

**Trust**

Suppose you/any one in the village need to stay outside the village for any reason, who do you think would look after your/others house and other assets? Please put a tick (✓) against your opinion and make comments as necessary.

Only blood relatives (Gusti)	[ ✓✓✓✓✓✓✓✓✓✓ ]
Village friends	[   ]
Any one from the village	[   ]
Some one outsider	[   ]

**Summary: All**

and transformed into a **synthesized** summary as follows:

- When respondents were asked about informal networking and mutual support almost all reported of individualism.
- In a response to solidarity for example of thinking about overall village development a large majority voted in favour of being self centred thinking where a few who responded in favour of community development.
- When asked if there was someone thinks about the community development voluntarily, a large majority indicated that there are no such people in the community.
- While asked about trust whether can only close relatives be trusted or a larger group of villagers, all replied in favour of trusting close relatives (gusti) and neighbours only. In a similar question to resolve disputes between neighbours, a large majority trusted local leaders and few trusted neighbours elites.
- While asked if younger misbehaved with elderly or do ill activities, a large majority trusted close relatives and neighbours.
- When asked about collective action in last five years all responded that there was no evidence of such collective actions in last five years.
- The key informants from the community reported of prevalence of self-centred thinking, disbelief, mistrust between community members. They also reported of social conflicts between households and between ethnic groups.

In order to make a judgement about ranking, a summary statement was made from the above explanation, and in this case given as an example above; the respective statement was expressed as:

*“Informal networking and mutual support among community members was poor. Trust, reciprocity and solidarity in the community are poor. There has been no community collective action during the last five years”.*

Accordingly, summary statements for other cases were also generated and appear as follows:

**Case 1** Informal networking and mutual support among community members was poor. Trust, reciprocity and solidarity in the community are poor. There has been no community collective action during the last five years.

**Case 2** Informal networking and mutual support among community members was fair. Trust, reciprocity and solidarity in the community are fairly good. Community collective action reported well.

**Case 3** Informal networking and mutual support among community members was relatively poor. Trust, reciprocity and solidarity in the community are relatively poor. Community collective action reported fair.

**Case 4** Informal networking and mutual support with in community members was good. Trust, reciprocity and solidarity among community members are good. Sense of collective action is very strong.

**Case 5** Informal networking and mutual support among community members was good. Trust, reciprocity and solidarity in the community are good. Community collective action reported well.

**The statements made against each case were weighted, as**

*Good (Networking, trust, reciprocity, collective action) = 5*  
*Fair (Networking, trust, reciprocity, collective action) =3*  
*Poor (Networking, trust, reciprocity, No collective action) =1,*  
**for example, for Case 1 it given as 1**

Similarly, according to these statements a rank order was made and presented as

**3..... Case 1 = 1.5; Case 2 = 3; Case 3 = 1.5; Case 4 = 4.5 and Case 5 = 4.5**

### **External Interventions**

Information on the presence of interventions in each community was gathered by focus group discussions with the community members. The mean value for each case was calculated as the score distributed below depending upon their targeting and utilities as perceived.

Commercial Bank = 1, DAE, DoF, DLO, DoY, Co-operatives, Social welfare = 2 NGOs and Health = 3. Case villages can be ranked on the basis of the presence of interventions as follows:

**Case 4** at the top with a large numbers of interventions including Commercial Bank; DAE; DoF; DLO; DoY; Co-operatives; Social welfare and Health have been providing a variety of information and supports to the community.

**Case 5** with moderate interventions Commercial Bank; DAE; DoF; DLO and Health/NGO have been providing development support in the community.

**Case 2** with moderate interventions and Commercial Bank; DAE; DoF; DLO and Health/NGO have been providing development support in the community.

**Case 3** with few interventions having commercial Bank; DAE; DoF and Health/NGOs have been providing development support in this community.

**Case 1** at the bottom with very few interventions and commercial Bank; DAE and Health/NGOs have been indicating an extreme deficit of information and poor services to the community.

**4..... Case 1 = 1; Case 3 = 2; Case 2 = 3.5; Case 5 = 3.5; Case 4 = 5**

### **Social Development Overall Summary**

On the basis of the weighted scores emerged in the following parameters a rank/ordering was made to eventually reach what Miles and Huberman (1994) suggested as Rank/Ordering for overall Social Capital in the community and are presented in the following Table 4.32. As Miles and Huberman (1994, p.187) cited *'it is a powerful way to understand differences across cases'*. They further added that *'pattern can be seen for high, medium and low cases, and the beginnings of explanations can emerge'*.

**Table 4.32: Overall Ranking of Social Development**

<i><b>Parameters</b></i>	<i><b>CASE 1</b></i>	<i><b>CASE 2</b></i>	<i><b>CASE 3</b></i>	<i><b>CASE 4</b></i>	<i><b>CASE 5</b></i>
1... Social Structures	1	3	5	4	2
2... Closeness	1	3.5	2	5	3.5
3... Social Capital	1.5	3	1.5	4.5	4.5
4... Development interventions	2.5	4.5	4.5	1	2.5
<i><b>Total Weighted Score</b></i>	<i><b>6</b></i>	<i><b>14</b></i>	<i><b>13</b></i>	<i><b>14.5</b></i>	<i><b>12.5</b></i>

### **4.2.3. EXTENSION**

Information collected on extension through structured questionnaire, interviews, key informant interviews and document surveys have been described in Chapter 3. Again,



following Miles and Huberman (1994), this information was summarised against each subsection dealing with qualitative descriptions/statements as a set of brief sentences as “statements” at case level for cross case comparison. It is necessary to place some value on these statements in order to achieve a rank position.

Afterwards the “ summary statements” against each parameter derived from individual case description were compared and **ranked/ordered** across cases (Miles & Huberman, 1994) to reach a rank position for extension status against each case.

**The data has been collected on the following parameters.**

- 3.1. The aims and objectives of the programme
- 3.2. Targeting
- 3.3. Variety of information
- 3.4. Training arrangements
- 3.5 Input supply mechanism
- 3.6 Use of extension methods
- 3.7 Use of extension materials
- 3.8 Cost effectiveness of the programme

In the forthcoming Section a demonstration of how the raw data has been handled to reach a “ summary statement for cross case comparison will be made. For **example, let us take 3.3 above namely variety of information.** Data gathered on variety of information provided by each extension approach from extension providers was then converted step by step into a summary statement as follows:

**Data collected from Extension officers**

When asked to the Upazilla Fisheries officers, they responded that the farming community has been provided with basic information on fish culture, rice fish culture and vegetable cultivation and has been agreed by the recipients. They received information through training, meetings and by individual counselling. They were also asked to contact the local Upazilla Fisheries Officers; NFEP extension officers based at each district headquarters; local block supervisors of agriculture department; trained teachers and trained fry traders. Most of these officials reported networking. In addition, they also have received information on credit availability. The NFEP annual report 1998 also reported keeping farmers informed about small-scale collateral free credit from the Janata Bank.

### Data collected from reviewing documents

*Islam (1996) cited that 'it is also envisaged that, should the group prove to be well motivated that it will be used for the integration of other development activities such as rice fish, dyke cropping. An existing group would similarly be a useful base from which other sectors such as primary health care organisation could work'.*

Let us therefore, record this as

**“This is a rich variety of sources of aquaculture information and other support facilities”.**

Similarly, statements were generated made for other cases and are presented below:

**Case 1**, No intervention as control

**Case 2**, programmes to extension offer semi-intensive fish culture technology to the RD and FF.

**Case 3**, approaches to extension provides information on Models and methods of fish culture appropriate for poor farmers are being given to the demonstration farmer.

**Case 5**, this is a comprehensive approach, a large variety of information including health and education; sanitation etc has been offered to the group members.

On the basis of the patterns and trends that emerged in parameters in this case, variety of information was then given weighting on proportionality Scores as: No intervention = 0; *on Fish only =1; on Fish+ Crops =2; Fish + Comprehensive (Awareness growing, Health, Skills training) =5*

<b>Parameter</b>	<b>CASE 1</b>	<b>CASE 2</b>	<b>CASE 3</b>	<b>CASE 4</b>	<b>CASE 5</b>
3.3 Variety of information	0	1	1	2	3

Similarly all the remaining parameters have been given a proportionality weighting to arrive at a rank /order for overall Extension Status of the Cases as presented in **Table 4.33**.

**Table: 4.33 Weightings of Extension Parameters**

<b>Extension Parameter</b>	<b>Proportionality Score</b>
Aims and objectives (Choices)	<i>Fish culture=1 Fish culture and groups formation=3 Fish culture and community development=5</i>
Targeting	<i>Male and rich mostly and Male and Poor only =1, Male and Female=3 All (Male and Female)=5</i>
Variety of information	<i>Fish only =1; Fish+ Crop =2; Fish + Comprehensive (Awareness growing, Health, Skills training) =3</i>
Input supply (Direct Credits, Liaisons of Credit, Information on availability of fish species, inputs)	<i>Credit and other supports=3 Liaisons of credit=2 No credit=1</i>
Use of extension methods	<i>Large numbers=5 About half=3 Some =2 A few =1</i>
Use of extension materials	<i>Large numbers=5 About half=3 Some=2 A few=1</i>
Modes of Training	<i>Training Centre based=1 Training centre + Community Based=2 Community Based=3</i>
Cost effectiveness	Cost per farmer contacted

### Extension Overall summary

The overall ranking for extension was then determined by these parameters is given in Table 4.34 below:

**Table 4.34: Extension overall Summary**

<i>Parameters</i>	<i>CASE 1</i>	<i>CASE 2</i>	<i>CASE 3</i>	<i>CASE 4</i>	<i>CASE 5</i>
Targeting	1	2.5	2.5	5	4
Variety of information	1	2.5	2.5	4	5
Aims and objectives Flexibility (Choices)	1	2.5	2.5	4	5
Input supply	1	2.5	2.5	4	5
Methods of Training	1	3.5	2	5	3.5
Use of extension methods	1	4	2	4	4
Use of extension materials	1	5	2	3.5	3.5
Cost effectiveness (Cost per farmers )	1	5	2.5	4	2.5
<b>Total Weighted Score</b>	<b>8</b>	<b>27.5</b>	<b>18.5</b>	<b>33.5</b>	<b>32.5</b>

### 4.2.4 POVERTY

Information collected on various aspects of poverty through structured questionnaire; focus groups discussion and key informant interviews have been described in Chapter 3. To make all data comparable, mean values from scores were used (Miles & Huberman, 1994).

The following section illustrates how the data presented at case levels has been handled and made comparable across cases as follows:

#### Food levels

Data collected on food levels at case levels using raw data sheets. Notes were also taken during interviews. In order to make sense of the data presented as statements in focus group interviews the following procedure was undertaken. Let us take for example the interviews with Case 4 members.

An example of the grid sheet used for collecting data on overall food situation is given at Table 4.19.

The following box illustrates a digest of the notes taken in Case 4 relating food consumption as follows:

**Digested notes on Food levels**

Groups I&II and III stated to have much greater **choice** than Group IV indicated during focus group discussions. These former groups accounted to eat **high value food** items such as meat; fish; eggs; milk and fruit **throughout the season**. Group I&II members reported to **eat more than three times a day**. Group IV commented to have more fish and vegetables. They recorded to eat meat and fruits to a **limited period** in the year. They cannot also afford expensive food items throughout the year. Group III did not indicate to suffer from **food deficit**, however, options of buying expensive foods get limited during certain periods of the year. Only group IV members reported to suffer from food deficits in terms of short meal size in 1999 for very short period. Again some members from Group IV reported to **eat less** food during crisis and in particular, the female members. Females in group III& IV reported to eat less of the expensive food item such as meat, fish etc during crisis and also indicated of **smaller meal size**.

The sort of words we look for are “choice”; “high value foods”; “through out the year”; “3 times a day”; “limited period”; “food deficit”; “eat less”; “smaller meal size” together with members positive or negative qualifiers and gender related comments.

Information from the grid and texts as explanations was synthesised and made as a set of comparable brief sentences (Mile & Huberman, 1994). In **Case 4**, for example, “*No remarkable changes in food levels among Groups between 1996 and 1999 but Group IV had poorer diet than that of others particularly female members*”. Similarly statements for other cases were also generated as:

**Case 1** *No significant changes in food levels among groups between 1996 and 1999. Only Group IV respondents reported to suffer from food deficit up to 3 months in 1999. Females of the above group even indicated to have experienced particularly less food during food shortage. This group also take poorer diet compared to others.*

**Case 2** *No significant changes in food levels among groups between 1996 and 1999. Some Group IV respondents mentioned deficits in food up to 3 months both in 1996 and 1999. Females from this category stated to get less food during food crisis. This group also take poorer diet compared to others.*

**Case 3** *No noticeable changes in food levels among groups in 1996 and 1999. Groups III and IV members reported food deficit up to 6 months in 1999. Some members of Groups III and IV indicated food shortage in 1999 and also females get less food during crisis. Again it is to note that women reported to eat less in case of Group III and IV. This group also take poorer diet compared to others.*

**Case 5** *No notable changes in food levels among groups between 1996 and 1999 but some from Groups III and IV reported to suffer food deficits up to 3 months in terms of having a short meal during.*

For cross case comparison, the statements above were reduced down to a single description.

The above summary statements were then phrased (Miles & Huberman, 1994) as:

“The situation of food levels in **Case 4** was **good** since only a few members from Group IV reported to suffer from food deficits in terms of having short meal size at certain periods of the year. Moreover, members from most groups reported having a wide variety of food items”.

The other cases were digested similarly as statements and as follows:

“The situation of food levels in **Case 5** was **moderate** since only some members from Group IV reported food deficits upto 3 months and the choices and selection of food items were moderate”

“The situation of food levels in **Case 2** was **moderate** since only some members from Group IV reported to suffer from food deficits up to 3 months but and the situation in unchanged between years. Choices and selection of food items was moderate”.

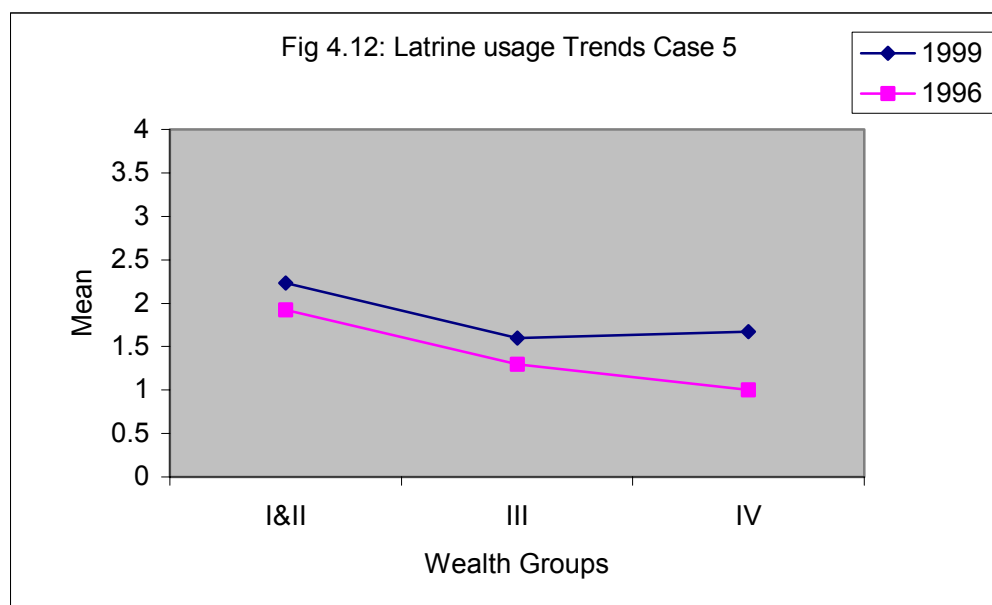
“The food situation in **Case 1** was **poor**. The situation of food items has worsened in since some members from Group IV indicated to suffer from food deficit in 1999. But the choices and selection of food items were moderate”

“The food situation in Case 3 was **poor** the food levels worsen since some members from both Groups III and IV reported to suffer from food deficits up to 6 months. The choices and selection of food items were poor in this village as well”.

This led to a rank order for food levels of Case 1 and 3 as “poor” (ranked 1.5), Case 2 and 5 as moderate (ranked 3.5) and Case 4 as good (ranked 5) presented in **Table 4.38**.

### **Housing, Drinking water and Latrine Conditions**

The data here are presented as progress towards an absolute standard. Thus, for example, when a household has a “Pacca” latrine then there is little prospect for further improvement. In such a situation we must estimate relative conditions by the amount of progress that has been made, particularly for Group IV. As an example, let us take latrine use in Case 5. The 1996 latrine data mean value was 1 and for 1999 the mean value was 1.67. The difference was 0.67, which, therefore, represents a measure of improvement. Similar figures were developed for the other cases in the same way and are presented below (See Fig. 4.12).



The rank and order has been decided based upon the *Degree of improvement*

**The respective improvements in latrine usage for Group IV between 1996-99 are**

***Case 4 - Case5 - Case 3 - Case 2 - Case1***

**Therefore, the rank and order are presented on a 1-5 Scale (Miles and Huberman, 1994) as follows:**

Case 4 = 5 made highest improvements

Case 5 = 4 made 2<sup>nd</sup> higher improvements

Case 2 = 3 made 3<sup>rd</sup> improvements

Case 3 = 2 made 4<sup>th</sup> improvements

Case 1 = 1 made least improvements

Similarly the improvements in housing and drinking water situation have been analysed and ranked/ordered in the same way and presented and compared across cases.

### **Common Diseases and Medical Preferences**

Data collected on common diseases and medical preferences were gathered as opinions and presented as explanations (**See Box below**). The following section sets out to illustrate data



synthesis using **Case 4** as an example for common disease and medical preferences at cross case level as follows:

**Digested Data/Notes taken during focus group interviews**

The general health conditions of the **large majority** of people are **good**. **Some** people from Group I&II reported to suffer from cardiovascular disease, which was not reported by other groups. On the contrary, a few people both men and women from Group IV reported to suffer from gastrointestinal disease, which was **not common**. Cold and aches are common problem among male of all groups.

Some Group IV females also reported to **suffer** from dysentery where as Groups I&II and III reported of common cold and headache.

Among all Groups children reported to suffer from worm among all groups and scabies in particular in Group IV informing poor hygiene. Some Group IV children reported to suffer from dysentery indicating poor sanitation.

The **village doctor** is common contact person for all groups of people. People from all groups reported visiting **M.B.B.S** in acute cases. Some of Group I&II and III members visited **specialist** too.

**Digested notes from key informant interviews**

The village elites as key informant reported that the general health conditions of the **majority of community members are good**.

The sort of words we look for are “vast majority”; “a few”; “good”; “suffer”; “Group IV”; “not common”; “poor hygiene”; “M.B.B.S”; “Village doctor”; “specialists” together with members positive or negative qualifiers and gender/children related comments.

Information from the above texts as explanations then enabled us to generate a set of comparable brief sentences (Mile and Huberman, 1994), for example, in this case, “*Health conditions among males of Groups I&II and III were better than Group IV and the preferences for medical treatment was higher in the former Groups. There were no differences in health conditions and preferences in medical treatment between male and females*”. Similarly statements were also made for other cases.

From the general statement a briefer sentence was generated, for example in this case:

**Case 4:** “*The overall health condition and medical preferences were good*”. Similarly statements for the other cases were also made as:

Case 1 The overall health condition and medical preferences were poor  
Case 2 The overall health condition and medical preferences were fair  
Case 3 The overall health condition and medical preferences were poor  
Case 5 The overall health condition and medical preferences were fair

Leading to a rank /order for health condition and medical preferences for

**Cases 1 and 3 as poor (ranked 1.5), Cases 2 and 5 fair (ranked 3.5) and Case 4 good (ranked 5).**

### Participation in Aquaculture

Data gathered for participation in aquaculture was analysed using the following procedure.

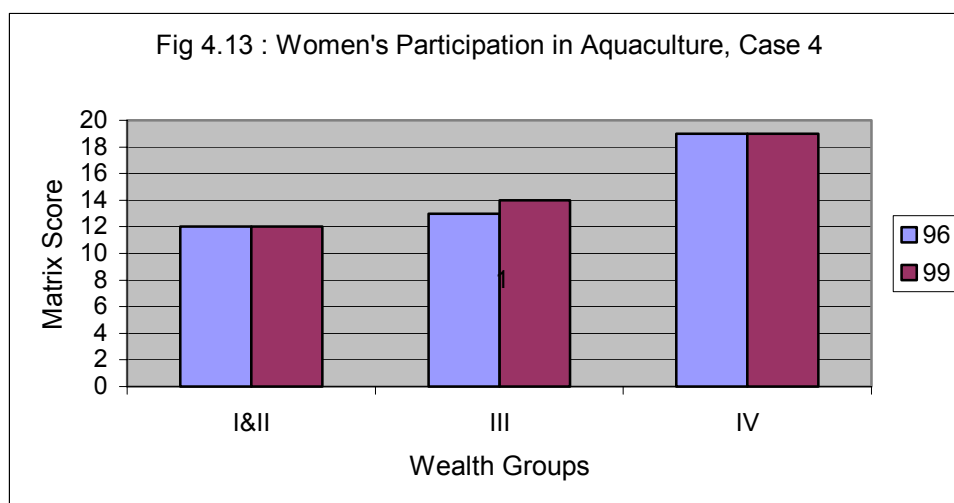
Here is an example of data handling for Case 4. It is important to note that data were compared at overall case level and Group IV levels. The following Table presents the perceptions of women's participation in aquaculture and put scores as proportions of participation.

<b>Table 4.35: WOMEN'S PARTICIPATION IN AQUACULTURE, Case 4</b>					
		<b>Women I&amp;II</b>			
		1996		1999	
		Men	Women	Men	Women
1	Pond construction/re-construction & repair	10	0	10	0
2	Drying out	10	0	10	0
3	Weed control/predatory fish control/poisoning	10	0	10	0
4	Liming	10	0	10	0
5	Fingerling purchase	8	2	8	2
6	Fingerling stocking	5	5	5	5
7	Feed/fertilisation applying	5	5	5	5
8	Fish marketing	10	0	10	0
<b>Total:</b>		<b>68</b>	<b>12</b>	<b>68</b>	<b>12</b>
		<b>Women III</b>			
		1996		1999	
		Men	Women	Men	Women
1	Pond construction/re-construction & repair	10	0	8	2
2	Drying out	10	0	10	0
3	Weed control/predatory fish control/poisoning	10	0	10	0
4	Liming	8	2	8	2
5	Fingerling purchase	8	2	10	0
6	Fingerling stocking	8	2	8	2
7	Feed/fertilisation applying	3	7	2	8
8	Fish marketing	10	0	10	0
<b>Total:</b>		<b>67</b>	<b>13</b>	<b>66</b>	<b>14</b>

		Women IV			
		1996		1999	
		Men	Women	Men	Women
1	Pond construction/re-construction & repair	10	0	10	0
2	Drying out	10	0	10	0
3	Weed control/predatory fish control/poisoning	10	0	10	0
4	Liming	8	2	8	2
5	Fingerling purchase	8	2	8	2
6	Fingerling stocking	5	5	5	5
7	Feed/fertilisation applying	0	10	0	10
8	Fish marketing	10	0	10	0
	<b>Total:</b>	<b>61</b>	<b>19</b>	<b>61</b>	<b>19</b>

### At Group IV level

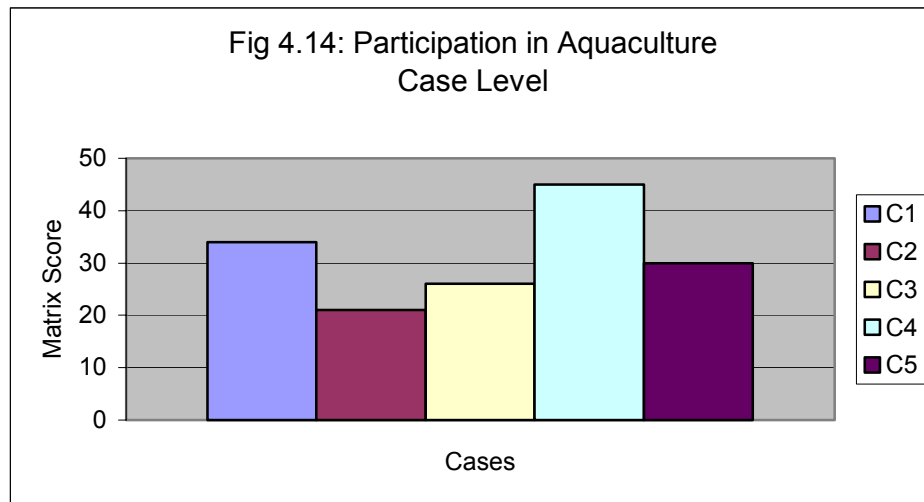
From the above Table, for example, the total score for Case 4, Group I&II were 12 and 12 in 1996 & 1999, for Group III were 13 and 14 in 1996 & 1999, Group IV were 19 and 19 in 1996 & 1999. These scores for 1999 were then plotted in a graph (See Fig 4.13).



Scores of Group IV were considered, as for example in Case 4 it was 19, and was plotted on a graph (See Fig. 5.7) along with the scores for other cases and compared across cases. Therefore the rank position for **Case 4 would be = 5; Case 1 = 4; Case 3 = 3; Case 5 = 2 and Case 2 = 1 respectively where 1 represents the Lowest Participation and 5 represent the Highest Participation.**

### At overall Case levels:

The total scores for all three Groups were then added together to get a total score for all respondents for each case, for example, in Case 4 they were for Groups I&II = 12 and for Group III = 14 and for Group IV = 19, which means the total score for Case 4 was  $12+14+19 = 45$ . Each of these case scores was then plotted on a graph for cross case comparison. (See Fig 4.14 below). **Therefore the rank position for Case 4 will be = 5; Case 1 = 4; Case 3 = 3; Case 5 = 2 and Case 2 = 1 respectively where 1 represents the Lowest Participation and 5 represents the Highest Participation.**



The Decision making trends were similarly analysed, presented and compared across cases.

### Memberships and Representation

Data was collected on membership and representation as the number of respondents who participated in various aspects of community life (See Section 3.4). Statements have been generated in the case descriptions from focus group interviews. Here is an example of the explanation generated from the raw data.

**Digested data from focus group discussion**

Male members from all Groups reported participating in Salish in 1999. But the number is highest among Group I & II. None from Group III reported to participate in local government or any clubs. Members from the same groups also reported to participate in school and puja committee.

No female respondents reported taking part in Salish. About Half from Group I & II members and Some from Group IV members reported participating in local government organisations. None of the female members reported participating in local government and clubs.

A large majority of females from Group IV reported adopting family planning techniques whereas the figures was reported as About Half and Some in case of Groups III and I&II respectively.

And these enable a general statement to be made, for example in **Case 4** as follows:

*“There was a positive change in participation in Salish among Groups III and IV males between 1996 and 1999. But the number is notably higher in Group I&II. There were no changes in female participation in Salish between years among the various wealth groups.”*

*“There were no changes in participation in local government between years among the various wealth groups. No females’ reported participating in local government, and no change in participation.”*

*“There were no changes in membership of school/puja committee between years among the various wealth groups. No females reported participating as memberships of school and puja committed, and no changes in the level of participation.”*

*“There were no differences adoption of ‘children by choice’ among wealth groups between years, with Group IV indicating a higher usage of contraceptive methods.”*

Following the same procedures, similar statements were also generated for other cases as follows:

**Case 1** No changes in participation in Salish between years with Group I&II members reported to be involved. No one reported to be involved in local government representation in both years. No changes in memberships in school/puja committee between years. No changes in 'children by choice' between years but numbers were higher in Group IV.

**Case 2** There were positive changes in participation in Salish in 1999 among male members of all groups. No participation in Salish among females in both years. There were no changes in participation in local government, only Group I&II members were involved. None of the females reported to be involved in either year. There were no changes in memberships in school/puja committee between years with only Groups I&II members being involved. None of the females reported to be involved in either year. There were no changes in 'children by choice', with Groups III and IV members indicating a higher take-up rate.

**Case 3** There were positive changes in participation in Salish in 1999 among Groups I&II and III members. No participation in Salish among females in both years. There were no changes in participation in local government, none of the respondents reported being involved. None of the females reported being involved in either year. There were positive changes in memberships in school/puja committee between years among Group I&II and IV members but it was more notable among Group I&II. None of the females reported to be involved in either year. There were no changes in 'children by choice' between years and take up rates were similar across wealth classes.

**Case 5** There were positive changes in participation in Salish among males members of Groups I&II and III and was limited between these two groups. No changes in females' participation in Salish at all. No changes in participation in local government among the

various groups of both males and females between years. No changes in memberships in school and puja committee between years among both males and females of the various wealth groups. There were no noticeable changes in 'children by choice' among groups between years, with Group IV indicating a higher take up rate.

Leading to a rank or for membership and representation of cases and as follows:

**Case 2** and **Case 4** positioned as *High participation (All groups) = 4.5* because members from all groups were involved in Salish. The distribution of involvement among groups was better in **Case 2**.

**Cases 5** and **3** were in a similar position and *Moderate Participation (limited to few groups) = 2.5* and, where members of Groups I&II and III reported being involved in Salish. The distribution of involvement was better in **Case 5** since higher numbers from Group III indicated being involved.

**Case 1** ranked at the bottom as *Low Participation (Very limited) = 1* because only Group I&II members were involved in Salish.

### **Recreation**

Data was collected on recreation from both males and females through focus group discussion.). Here is an example of the explanation generated from the raw data from Case 4 presented in the box below. The following section illustrates how the data has been handled to arrive at a rank position each case for cross case comparison as follows:

**Digested data from the focus group discussions**

A large number of male members among various groups had TV and radio at the house. Group III indicated going to the village theatre (Jatra). Group IV mentioned playing cards. Chatting was reported to be a common means of recreation among all groups.

TV and cassette players were indicated as common means of recreation for all groups of females. All groups reported going to cinema; attending religious gathering and joining in picnics occasionally. The use of radio and television were reported to be the highest among five cases under investigation and are widely distributed among all Groups. Group III reported to visit relatives most and puja in nearby religious places.

It is worth mentioning that both male and female groups indicated very high options of recreational means in this community. Children, both male and female, reported to have a number of means as recreation.

And these enables us to make a general statement to be made for example in this case as follows:

*“Options in means of recreation were high across cases and across wealth groups”*

And these enable a set of descriptive statements to be generated for cross case comparison and which for this case are as follows:

*“Options of recreation were high across wealth groups”*

*“There were no differences in means of recreation between various groups. The pattern is similar among female members”.*

The following summary statements have been generated for other cases similarly and are presented as follows:

**Case 1** There were limited options of means of recreation of both male and female members of the community. Most females used radio. Few members indicated visiting relatives and going to market as a means of recreation. Some indicated watching their neighbour's TV.



**Case 2** Options for recreation among all groups both male and female was moderate. No differences among wealth groups. A large majority of people have been watching TV, visiting relatives, listening to the radio.

**Case 3** Means of recreation was very poor among males and females irrespective of wealth groups. Some members indicated watching TV. Group IV indicated to chat only. Females indicated to chat and visiting neighbours only.

**Case 5** There were limited options of recreation of both male and female members of the community. A large number of people reported using radio and some have been watching TV. Some members reported going to the cinema.

Then, the above statements were given a score for example in **Case 4 as *High options* (score 5); Case 2 as *Moderate options* (score 4) and Case 1, 3 and 5 as *Low options* (Score 2)**

#### **Access to credit**

At cross case level increase/decrease in credits between years has been calculated as a **percentage** and presented. Figures should be considered as the percentage of credit recipients within the specified wealth group. Since we are looking at poverty impacts, comparison of credit at **Group IV** levels has been considered and compared across cases to reach an **order/rank**. The following Table 4.36, for example, presents the male credit recipients in Group IV in 1999 and are as follows:

**Table 4.36: Percentage of Males receiving Credit, Group IV 1999**

Case 1	5/6=83%
Case 2	3/3=50%
Case 3	4/6=67%
Case 4	1/6=17%
Case 5	5/6=83%

They are then plotted on a graph (Fig 5.17)

Table 4.37: Percentage of Females receiving Credit, Group IV 1999

Case 1	3/3=50%
Case 2	4/6=67%
Case 3	6/6=100%
Case 4	1/6=17%
Case 5	3/3=50%

These enable us to rank order the Cases by combining credit access by both males and females as follows:

**Case 1 and Case 5 rank highest and *given a weight of 4*** since in both cases and amongst both male and female members of Groups IV there are a higher level of credit recipients in 1999.

**Case 3 ranked at 2<sup>nd</sup> highest level and *given a weight of 3*** with moderate levels of credit in case of Group IV males and highest levels of credit in case of Group IV females.

**Case 2 with a modest level and *given a weight of 2*** with lower levels in both male and female credits amongst Group IV members.

**Case 4 with the lowest level and *given a weight of 1*** with low levels of credit for both male and females amongst Group IV members.

### **Overall Poverty impact Summary**

All the poverty indicators were compared across cases (1-5) and rank/order (Miles and Huberman, 1994) given individual weight against each parameter and a rank/order for each case has been established on the basis of poverty impacts upon the community as a whole for cross case comparison and is presented in Table 4.38.

**Table 4.38: Poverty Impacts Summary**

<i>Parameters</i>	<i>CASE 1</i>	<i>CASE 2</i>	<i>CASE 3</i>	<i>CASE 4</i>	<i>CASE 5</i>
Food levels	1.5	3.5	1.5	5	3.5
Drinking water	4	1.5	5	1.5	3
Housing	1	2	5	3	4
Latrine	1	3	2	5	4
Health and medical preferences	1.5	3.5	1.5	5	3.5
Decision making	5	2	4	3	1
Participation on Aquaculture	4	1	3	5	2
Memberships	1.5	4.5	2.5	4.5	2.5
Recreation	2	4	2	5	2
Credits	4	2	3	1	4
<b><i>Total Weighted Score</i></b>	<b>25.5</b>	<b>27</b>	<b>29.5</b>	<b>38</b>	<b>29.5</b>

### 4.3 Absence of Statistical Tests

Case study research is eclectic in nature (Adelman *et al.*, 1976). The study generated both qualitative and quantitative data, but mostly descriptive, qualitative data to enrich the available quantitative data, which might indicate links with other areas to pin point (Payne, 1993).

The use of statistical analysis was not relevant since, the purpose of gathering descriptive was to relate these to quantitative estimates as Payne (1993, p.39) stated that *‘if our purpose however, is not just to derive quantitative estimates of some variable, but to use qualitative information, to gain insights into processes, then these statistical rules are inadequate’*.

Similarly in explaining use of statistics measures, in case study research, Yin (1984, p.107) cited that *‘available statistical techniques are likely to be irrelevant because none of the variables in the pattern will have a “variance” each essentially representing a single data point’*.

Therefore, the use of any kind of statistical measures/tests has been avoided in this study.

In the next chapter, the cross case summaries, as explanations, have been written up by highlighting the essences of each indicator as grouped against aquaculture; extension; social development and poverty. Each case is ordered/ranked in a case ordered display (Miles & Huberman, 1994)) based on their relative scores drawn from the case descriptions. This firstly enables comparisons to be made across cases and secondly provides an explanation of the inter-relationship between these parameters (Miles & Huberman, 1994). Again, Miles & Huberman (1994, p.187) cited '*it is a powerful way to understand differences across cases*'. They further added that '*pattern can be seen for high, medium and low cases, and the beginnings of explanations can emerge*'.

## CHAPTER 5: CROSS CASE COMPARISON

The following chapter deals with the cross case comparison of findings between the 5 cases under investigation. This will eventually form the basis for framing the working explanations of the investigation to be tested subsequently. Important parameters with differences against four aspects such as Aquaculture; Social Development; Extension and Poverty will be taken into consideration and will be ranked by examining findings derived from each of the Case descriptions.

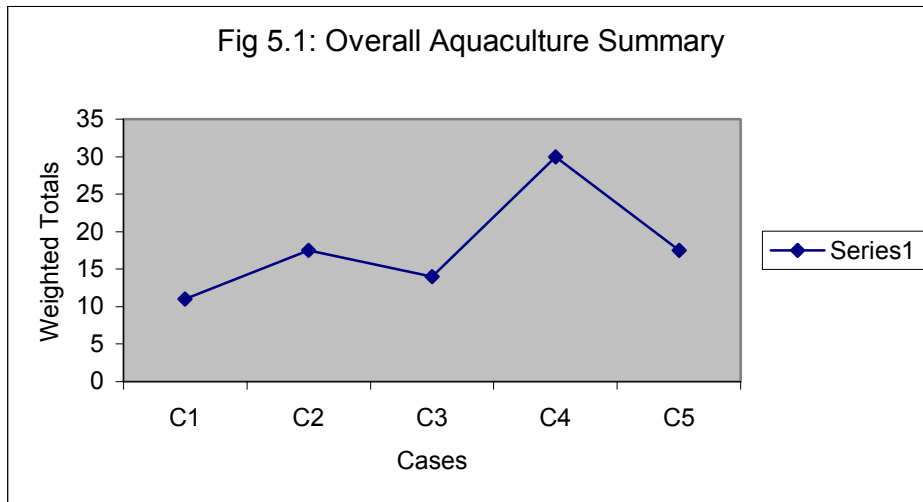
A summary of each community used to represent the cases under investigation in Phase 1 is presented in **Section 4.1**. The cross case comparison will be presented under the four headings as Aquaculture, Social Development, Extension and Poverty, using the methodology outline in the previous chapter.

### 5.1 AQUACULTURE

Aquaculture status in the study villages was measured based upon criteria laid out in each case description. The overall summary of aquaculture status of cases under investigation is presented in **Table 4.2**. From that Table it can be seen that NGO was better in most aspects, but the overall score for Trickle Down and NGO came out at similar levels. Demonstration was slightly better in fish consumption but was inferior in other parameters, whereas Control was inferior with regard to most parameters.

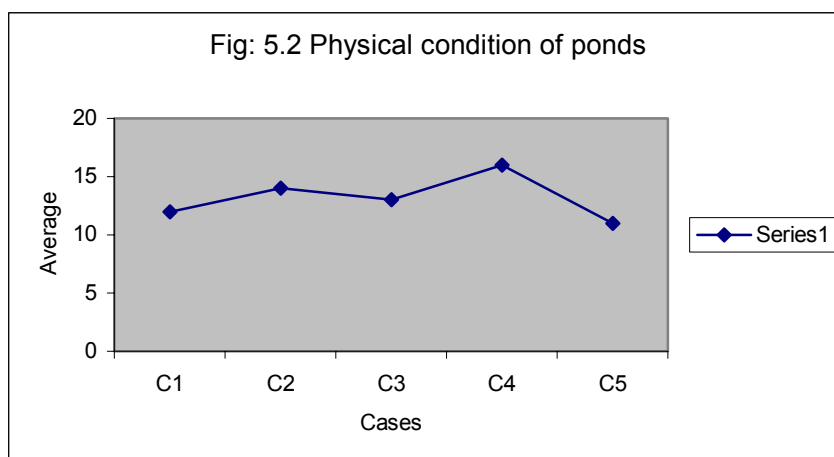
The overall weighted total of aquaculture status is plotted in a graph, (**Fig: 5.1**).

A brief description of the summary of those criteria has been presented below for cross case comparison and eventually assisted in the rank/ordering of each case based upon the criteria below



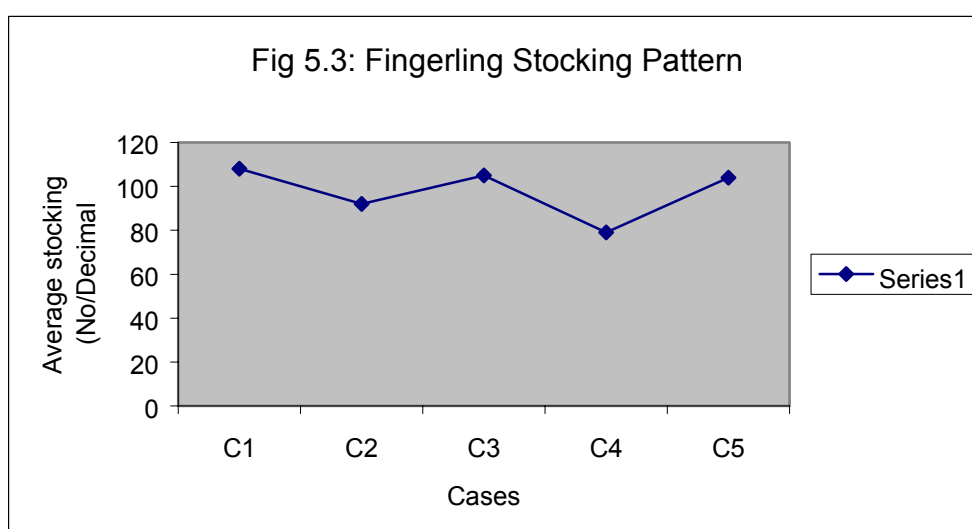
### Physical condition of ponds

The physical condition of a pond is a good determinant of aquaculture status. The calculated average gathered from the observational study in each village revealed that this was highest in **Model Village** indicating better pond conditions in overall measures. This was followed by **Trickle Down**, with a slightly lower average in **Demonstration**. In **Trickle Down**, the embankment situation, the integration of dykes and shading condition were poor where as in **Demonstration** the embankment situation was worse. There were actually no remarkable differences in physical conditions of ponds between **Trickle Down** and **Demonstration** but these were very low compared to **Model Village**. **Control** and **NGO** are positioned at the bottom with shading, dykes and watercolour being poor. The overall physical condition of ponds across cases is presented in **Fig 5.2** below.



### Fingerling stocking pattern

The stocking of fingerlings among all cases were higher than recommended by any extension approach. Comparing modest stocking across cases, **Model Village** was found to be stocked to a reasonable level followed by a higher level in **Trickle Down**. The selection, combination of fish species among all groups was better in the former cases, and also across cases. There were no remarkable differences in stocking density between **Control**, **Demonstration** and **NGO** but were high compared to **Model Village**, in particular. **Fig 5.3** summaries the fingerling stocking pattern across cases. The species composition was, however, fairly good in **NGO** but poor in **Control** and **Demonstration** respectively.

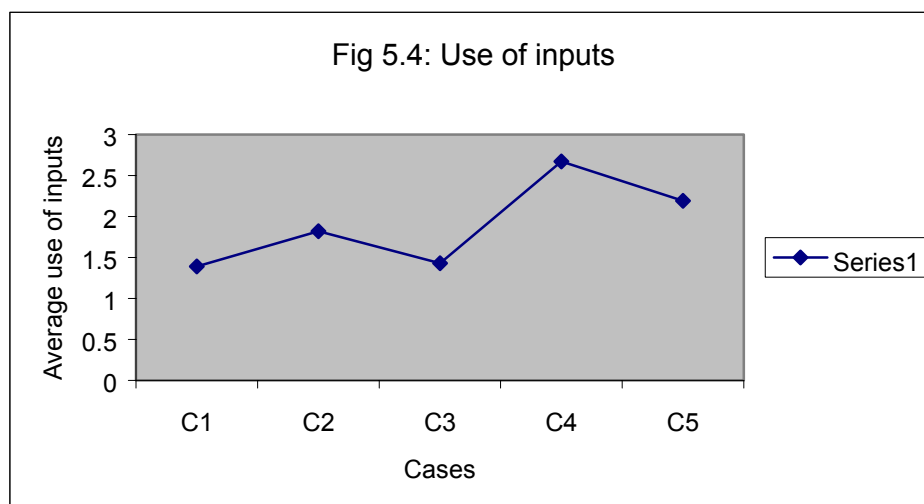


### Use of inputs

The use of inputs was notably higher amongst **Model Village** and **NGO** compared to **Control**, **Trickle Down** and **Demonstration**. It is important to note that the frequency of inputs was significantly higher among Group I&II and III compared to Group IV in **Model Village**. There were no changes of use and frequency in inputs between 1996 and 1999.

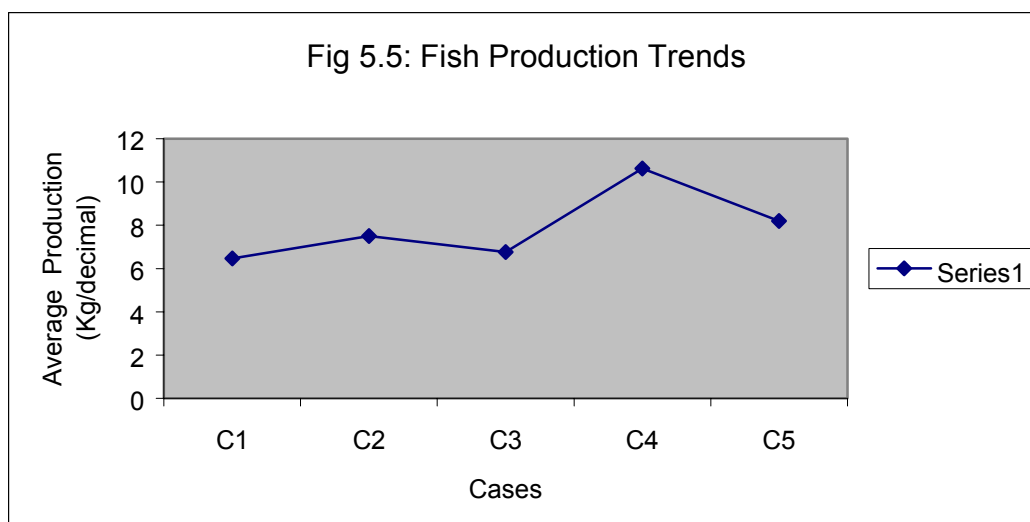
In **NGO** the frequency and use of inputs was higher among Groups I&II and IV compared to Group III. There were no changes of use and frequency of inputs among Groups I&II and III but the use of inputs was highest amongst Group IV in 1999. On the other hand in **Trickle Down**, the frequency and use of inputs was markedly higher among Groups I&II and III compared to Group IV. Changes in frequency and use of inputs were positive among all groups but the trend was more positive among Groups I&II and III. In **Demonstration**, the use and frequency of inputs was poor and was slightly higher between Groups I&II and III. There were no changes in the use and frequency of inputs between years. The use of inputs was lowest in **Control** across cases. In addition, there were no differences in the use of inputs among groups. There were no changes of frequency of use and use of inputs between years. Fig 5.4 summarises the use of inputs across cases.





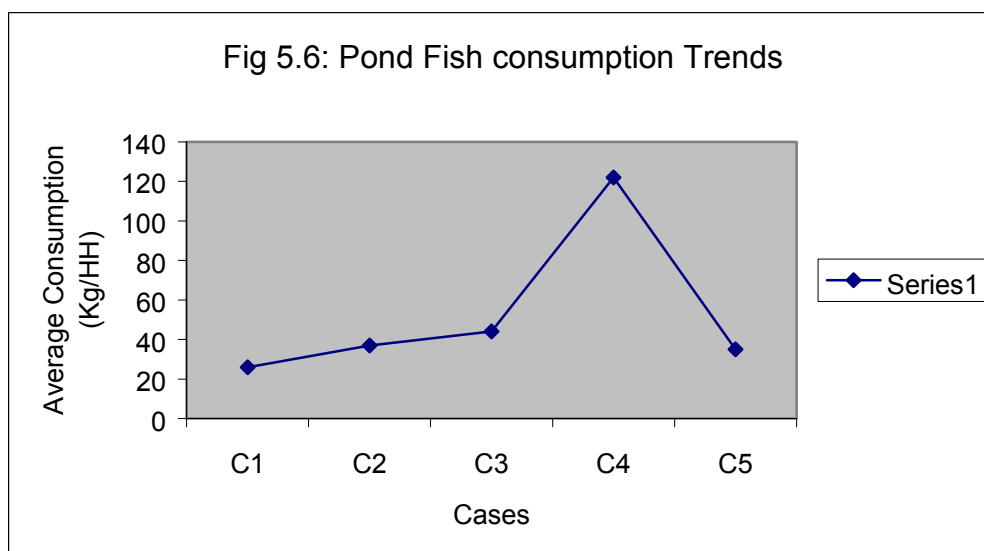
### Fish production

Average fish production was highest amongst **Model Village** followed by **NGO**. But was remarkably higher compared to others. It is important to note that changes in fish production between 1996 and 1999 was positive, and was higher among Groups I&II and III compared to Group IV. In NGO the change in fish production was positive, noticeable among all Groups but was higher among Groups I&II and III. Fish production amongst **Control**, **Trickle Down** and **Demonstration** was remarkably less with **Trickle Down** at a higher level. In the later, changes in fish production were positive among all Groups but the change was noticeable among Groups I&II and III compared to Group IV between 1996 and 1999. However, in the former changes in fish production between years were positive among all groups. Group I&II and III had slightly higher production. In **Control**, the average fish production was lowest across cases and changes in fish production were positive, but higher in Group I&II, in particular.



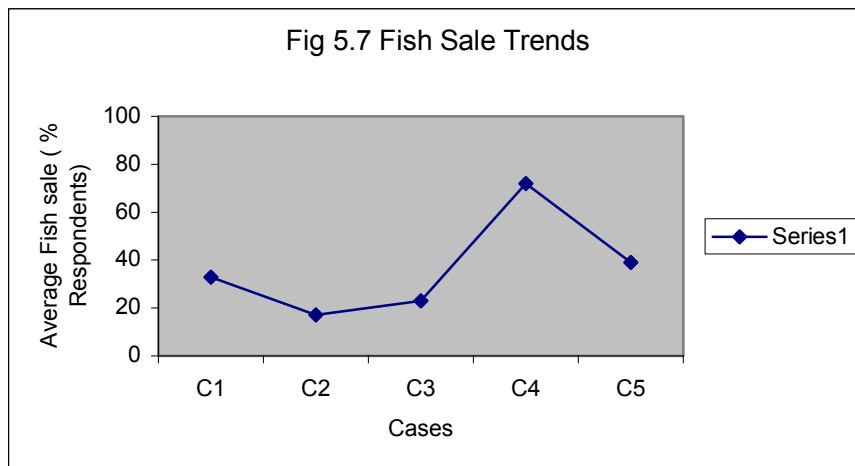
### **Fish consumptions from pond**

Average fish consumption per households from pond sources was reported highest in **Model Village**. It is worthy of note that fish consumption from pond sources has declined among all Groups but is notable only among Group III members. Consumption of fish from the same source was slight higher in **Demonstration** compared to **Trickle Down** and **NGO**, The former has similar fish consumption levels. Fish consumption from pond sources in **Demonstration** slightly increased among all Groups where as fish consumption from pond sources in **NGO** increased among Groups III and IV and the increase was most marked among Group IV. Fish consumption from pond sources in **Trickle Down** also increased among all groups. The **Control** recorded the lowest fish consumption and fish consumption from pond sources increased among Groups I&II and IV only. Fig 5.6 portrays the fish consumption levels across cases.



### Fish Sale Trends

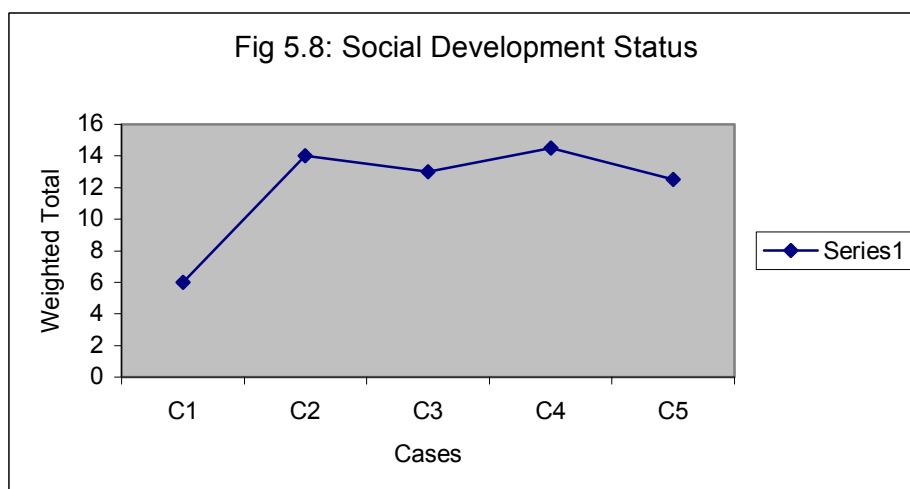
The numbers of farmers across all Groups who reported selling fish was highest in **Model Village**, and the number of farmers among Groups III and IV members who sold fish was highest in **Model Village** followed by **NGO**. In the latter case the number of farmers who sold fish was higher among Group III and IV and was markedly higher in IV compared to Group I&II. This indicates that aquaculture has been contributing to the overall household income among members in **Model Village** and **NGO**. Fish sales amongst **Control**, **Trickle Down** and **Demonstration** was markedly less with **Control** at a slightly higher level. In **Control** the number of farmers who sold fish was higher among Groups I&II and III and there were no sales among Group IV members. In **Demonstration** the numbers of farmers selling fish was higher in-Group IV. **Trickle Down** showed the lowest fish sales and therefore aquaculture has very little contribution to household income. Sales were only reported by Group I&II. A summary of the fish sale trends is presented below in Fig 5.7



## 5.2 SOCIAL DEVELOPMENT

This section will deal with the comparative analysis of reflections on interactions among community members and their involvement in networking in both formal and informal institutions for social harmony and improvement of livelihoods of the community members. The details are presented in Chapter 4. For details the overall summary of Social Development is set out in Table 4.32 in Chapter 4. From that Table it can be seen that **Model Village** has higher scores in all the parameters except closeness followed by **Trickle Down. Demonstration** and **NGO** were positioned at similar levels. The **Control** has low scores indicating the poorest Social Development across cases.

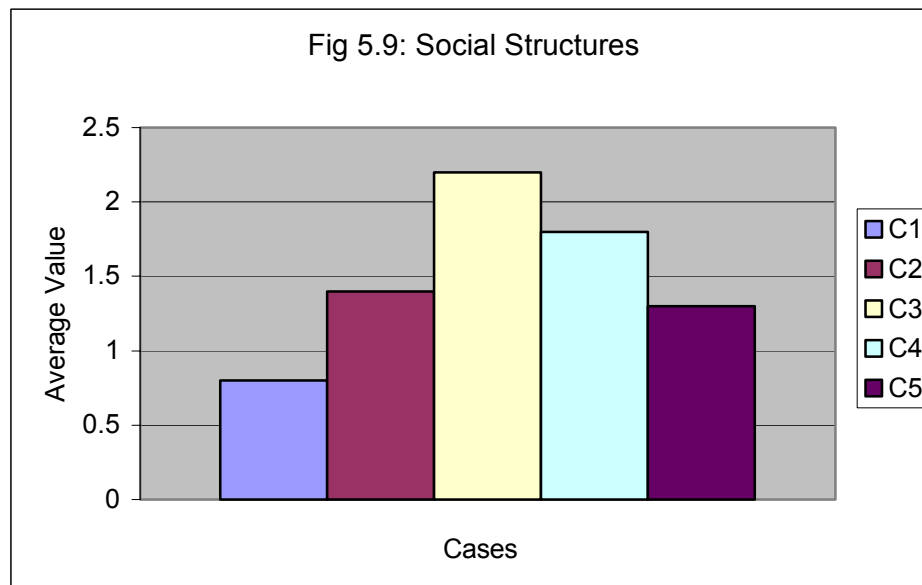
The total weighted scores are plotted in a graph and shown in Fig: 5.8 as follows:



The following section attempts to deal with a cross case comparison of the parameters for social Development and are as follows:

### Social Structures

On the basis of weightings given in Section 4.2.2 the mean value of social structures are presented in Fig. 5.9 below.

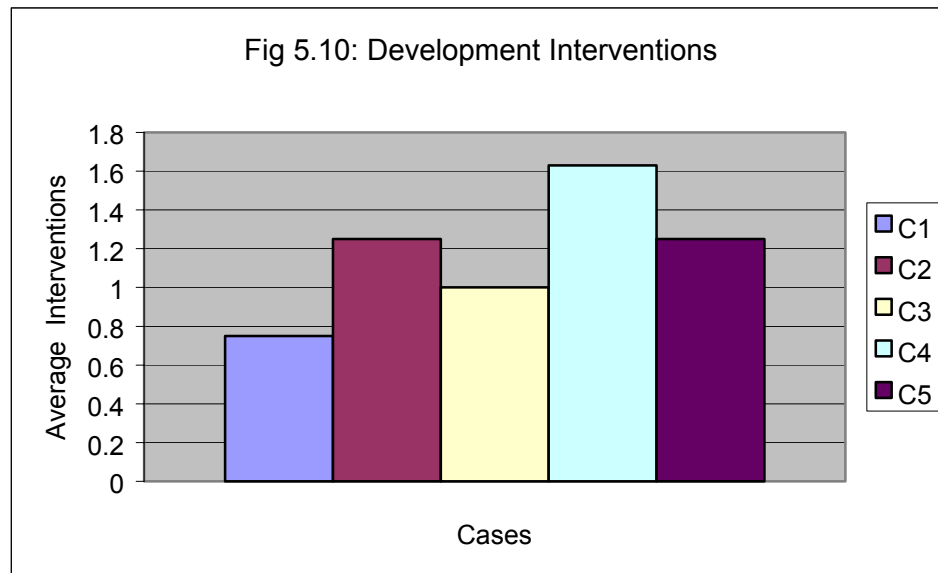


From the above figure the case villages can be rank ordered as follows:

**Demonstration** and **Model Village** had higher social structures of which **Demonstration** had a Government primary school; **NGO** had a primary school and Health centre/Clinic in the community. **Model Village** includes a Government primary school; an NGO primary school and Health centre/Clinic. It also had credit groups for females; a Village club; Mosques and Temples in the community. **Trickle Down** and **NGO** have moderate social structures where **Trickle Down** community has a Government primary school; and an NGO primary school in the community. In the **NGO** village there was a Government primary school. The **Control** with low social structures had a Government primary school; female credit group and a Temple only.

## External interventions

On the basis of weightings given in Section 4.2.2 the mean value of development interventions are presented in Fig. 5.10 below.



From the above Fig. 5.10 case villages can be ranked on the basis of the presence of interventions as follows:

**Model Village** at the top with a large numbers of interventions including Commercial Bank; DAE; DoF; DLO; DoY; Co-operatives; Social welfare and Health have been providing a variety of information and supports to the community.

**NGO** with moderate interventions Commercial Bank; DAE; DoF; DLO and Health/NGO have been providing development support in the community.

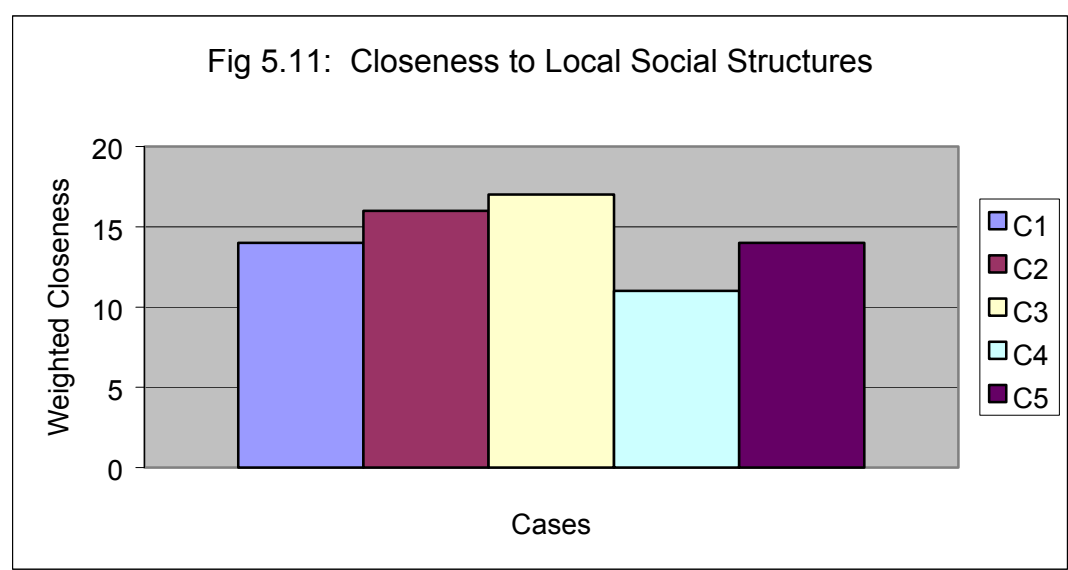
**Trickle Down** with moderate interventions and Commercial Bank; DAE; DoF; DLO and Health/NGO have been providing development support in the community.

**Demonstration** with few interventions having commercial Bank; DAE; DoF and Health/NGOs have been providing development support in this community.

**Control** at the bottom with very few interventions and commercial Bank; DAE and Health/NGOs have been indicating an extreme deficit of information and poor services to the community.

**Closeness to Local Social Services**

On the basis of weightings given in Section 4.2.2 the weighted totals against each case are plotted in the graph (Fig.5.11) shown below:



The rank order for closeness to local social services are as follows:

**Demonstration** with most services are to closest proximity with all local social services

**Trickle Down** with next closet proximity to local social services

**Control** in between all the cases

**NGO** moderately distant from all local social services

**Model Village** with distant locations from all the local social services

## **Social capital**

On the basis of weightings given in Section 4.2.2 Social capital was assessed on the basis of mutual support and networking; solidarity and reciprocity among community members.

The rank order for social capital across cases and the reasoning for ranking are as follows:

**Model Village** ranked at the top since peoples behaviour and other elements of social capital such as mutual trust; reciprocity; solidarity were good and sense of collective action reported as strong among community members. This community reported to help distressed people during crisis and marriage to orphans.

**NGO** ranked with **Model Village** since people's notions of social capital such as mutual trust; reciprocity; solidarity were good and sense of collective action reported well. There is evidence of assisting poorer people during crisis.

**Trickle Down** was third as the elements of social capital as mutual trust; reciprocity; solidarity were fair and sense of collective action reported as fair as well. Members reported to give food items and cash money in credit with out interest during crisis.

**Demonstration** was ranked at the bottom as elements such as mutual trust; reciprocity; solidarity were relatively poor and the sense of collective action was indicated as fair.

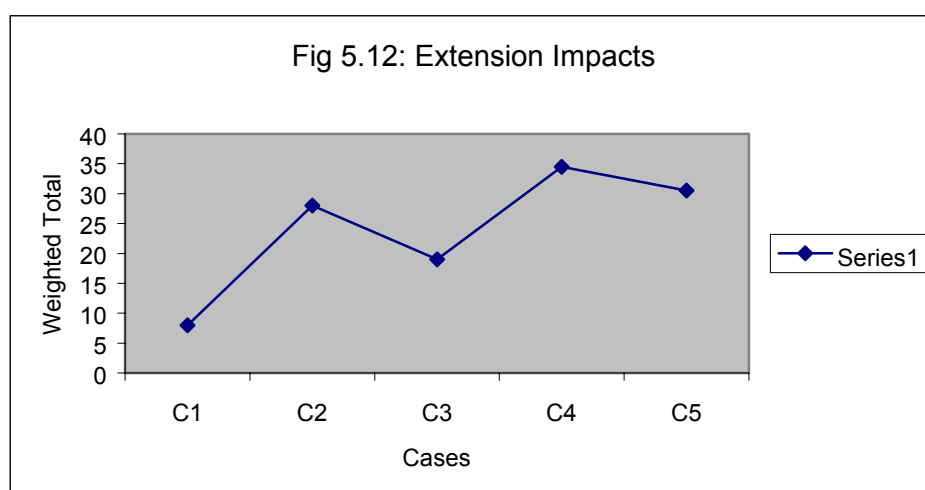
**Control** was also ranked at the bottom since elements such as mutual trust; reciprocity; solidarity were reported as poor and there was no evidence of any collective action in the last five years. There is also evidence of conflicts among community members.

## **5.3 EXTENSION METHODOLOGY**



Findings on the efficacies, impacts will now be highlighted for cross case comparison to assess and rank each extension approach and eventually to contribute in the hypothesis developed and be tested. The overall ranking for extension have been determined by these parameters and are given in **Table 4.34**. From that table it can be seen that **Model Village** was better in most parameters and **Trickle Down** and **NGO** were at a similar levels. **Demonstration** was poor in training methods, use of extension materials and use of extension methods, in particular.

The weighted total of overall extension parameters is plotted in a graph and is shown in Fig: 5.12



The following section sets out cross case comparisons of extension parameters as follows:

**Control** represents a null case of interventions. There has been very little intervening of development organisation in this community. There was no fisheries extension, in particular, both by the public sector and the private sector. Only the health visitor and sugar mills authority are seen to be moderately active. It is worth to mention that there was a private farm nearby and a few people indicated to get information on high yielding crops from neighbouring farmers, who have contact with the nearby private farm. These people were generally from

wealthier section of the community. Only a few members expressed having linkage with the nearby commercial bank and have been receiving credits. One staff member of the local Upazilla Fisheries Office who has been working in this Upazilla for more than 10 years has identified this community as one that is with out contact with the fisheries office. He mentioned that they did not work in this community, while asked reasons mentioned distance from the head quarter. The local assistant fisheries officers also reported the same. The key informants from the community also confirmed of very low contact between the extensions agencies both from the government and the NGOs and the community members. On the whole, people's contact with extension/development agencies was very poor.

### **Aims and Objectives of the extension programmes**

The summary statements taken from the case descriptions on aims and objectives are as follows:

The overall aim of **Trickle Down** approach to extension was to transfer and demonstrates semi-intensive fish culture technology to the locality and to establish local extension agent.

**Demonstration** approach indicates a very strong technical approach to extension where a fixed package has been demonstrated with a view to demonstrate technology to the community assuming that the demonstration farmer will adopt techniques and the pond will be used as model farm.

**Model Village** The overall aim of Model Village is to enable farmers to participate and better utilize their resources, disseminate aquaculture information and overall fishers' community formations. The various actors involved appeared to understand this well.

The overall aim of **NGO** approaches to extension was to form groups from poor and marginal members of the community and increase fish production and overall livelihoods improvement of group members, in particular.

The overall rank order for aims and objectives based upon the above box are as follows:

**Model Village** aims to put forward technical options to the community members and encourage them to organise and plan for themselves and facilitates not dictates. This will enable community members to utilise their own resources considering their resource endowments. Formation of fishers' communities to enhance sharing of information and eventually more opportunities for learning.

**NGO and Trickle Down** provide technical packages and ask people to follow this a sort of transfer of technology and also in case of **NGO** form groups both male and female and in case of **Trickle Down** trying to form local extension agents.

**Demonstration** aims to provide technical packages and ask people to follow this a sort of transfer of technology and to benefit from it.

### Targeting

The summary statements taken from the case descriptions for targeting are as follows:

**Trickle Down** programme targets innovative male farmers mostly who are generally from the rich and medium farmers.

**Demonstration** This is a poverty focused extension programme and therefore selects poor farmers on the basis of wealth ranking.

**Model Village** is targeting all categories of farmers irrespective of wealth and gender.

**NGO** target groups are the members of poor and marginal section of the community including male and a greater emphasis on female members selection.

The rank/order for targeting by various extension approaches base upon the above box with brief reasoning are as follows:

**Model Village**, all pond owners irrespective of wealth class in the community were targeted through this extension approach and the pond owners have affirmed this. Women members of the pond owning households have also reported received training under this approach.

**NGO** targets groups and male and female together.

**Trickle Down** targets male and rich mostly and

**Demonstration** target poor and males mostly.

### **Variety of information**

The summary of statements derived from the case description against each case

on variety of information are as follows:

**Trickle Down** programmes to extension offer semi-intensive fish culture technology to the RD and FF.

**Demonstration** approaches to extension provide information on Models and methods of fish culture appropriate for poor farmers are being given to the demonstration farmer.

**Model Village** This is a rich variety of sources of aquaculture information and other support facilities. It has been providing basic information on fish culture, rice fish culture and vegetable cultivation and also on credit availability.

**NGO** this is a comprehensive approach, a large variety of information including health and education; sanitation etc has been offered to the group members.

The rank order for variety of information with a brief explanations based upon the above box are as follows:

**NGO** approach to development is comprehensive. To implement comprehensive development they provide information on agriculture; livestock; fisheries; health and sanitation; plantation; education on issues like human rights, women rights etc. RDRS also act as building block to establish linkage of group members with other agencies promoting development.

**Model Village** provides information on fish culture and dyke cropping and also availability of credit. Which allows people to think about integration of aquaculture to achieve maximum outputs from the agro-aqua system.

**Trickle Down** and **Demonstration** provide information mainly on fish culture and therefore provides limited information on their livelihoods.

### **Training arrangements**

The summary statements derived from the case descriptions for cross case comparison on training arrangements are as follows:

**Trickle Down** provides two half day training was organised at the training centre and half-day pond site training was organised for the RD.  
**Demonstration** supported with three half day center based training has been provided to the demonstration farmer.  
**Model Village** has a provision of three half day practical training for men and a half-day training for women have been organized in the community. There was a provision of one-day refreshers training for farmers in the 2<sup>nd</sup> year.  
**NGO** assist with three-day centre based training was offered to the group members on aquaculture only. They also receive other skills and awareness training during the course of their membership.

The rank order for training based upon the above box are as follows along with the reasoning for rank ordering:

## CHAPTER 6: FRAMING WORKING EXPLANATIONS

In this Chapter I will firstly establish patterns from the rank/order of cases derived from **Chapter 5** according to Aquaculture; Social Development; Extension and Poverty and secondly gauge the linkages of relationships, in other words, the possible cause and effect relationships (Miles & Huberman, 1994; Denscombe, 1998) between the following:

1. aquaculture with extension; social development and poverty;
2. social development with aquaculture; extension and poverty
3. extension with aquaculture; social development and poverty
4. poverty with aquaculture; social development and extension

Miles & Huberman (1994, p.90) termed such case explanations as *'making complicated things understandable by showing how their component parts fit together according to some rules'*.

This was done following pattern matching logic since Yin (1984, p.103) cited that *'for case study analysis, one of the most desirable strategies is the use of pattern matching logic'*.

This was further supported by Denscombe (1998, p.211) who stated that qualitative research identifies the *'patterns and processes, commonalities and differences'*. He further added that *'the real value of a case study research is that it offers the opportunity to explain why certain outcomes might happen- more than just find out what those outcomes are'*.

Finally, I will build, what Mason (1996, p.154) has called a “strategic comparison”, to generate working propositions and eventually to test against Phase 2 findings. A strategic

comparison, which she defined as ‘*those [comparisons] which enable you to test and develop theoretical and explanatory propositions*’.

Yin (1984, p.106) suggested that: ‘*the role of the general analytic strategy would be to determine the best ways of contrasting any differences as sharply as possible and to develop theoretically significant explanations for the different outcomes*’.

### **6.1 Case Impacts and Relationships**

From Chapter 2 it was argued that: “aquaculture extension approaches that fail to substantially address social development will lead to no more than a superficial reduction of poverty”. The rank/ordering of cases under investigation in terms of Aquaculture Status; Social Development; Extension and Poverty are presented in Fig: 5.1; Fig 5.8; Fig 5.12 and Fig 5.13 respectively, where, the *higher weighted total score indicates a more positive status*.

The rank/order of cases for Aquaculture is presented in **Fig: 5.1 (for details See Chapter 5)**, it is seen that Model Village is positioned at the top, followed by NGO with Trickle Down having a closely similar position. But the gaps of the latter are higher compared to the former. Control stands at the bottom with Demonstration having a marginally higher position and the gaps between these with Model Village, in particular, are very high.

The rank/order of cases for Social Development is presented in **Fig. 5.8 (for details See Chapter 5)**. It shows a much less distinctive ordering where Model Village is just positioned at the top, followed by Trickle Down with a slightly lower position. NGO and Demonstration at a similar level but are somewhat lower than the former cases. Control

indicated worst in social development and is positioned at the bottom and the gap compared to all other Cases is very large.

The rank/order of cases for Extension is presented in **Fig: 5.12 (for details See Chapter 5)**. It represents that Model Village is again positioned at the top, followed by NGO with a slightly lower position. Trickle Down is followed by Demonstration and Control stands at the bottom. The gaps between Control with all other cases are very high.

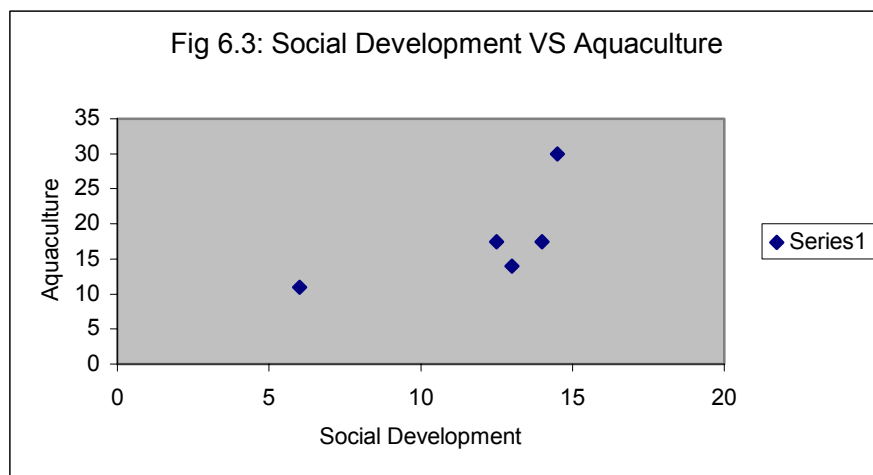
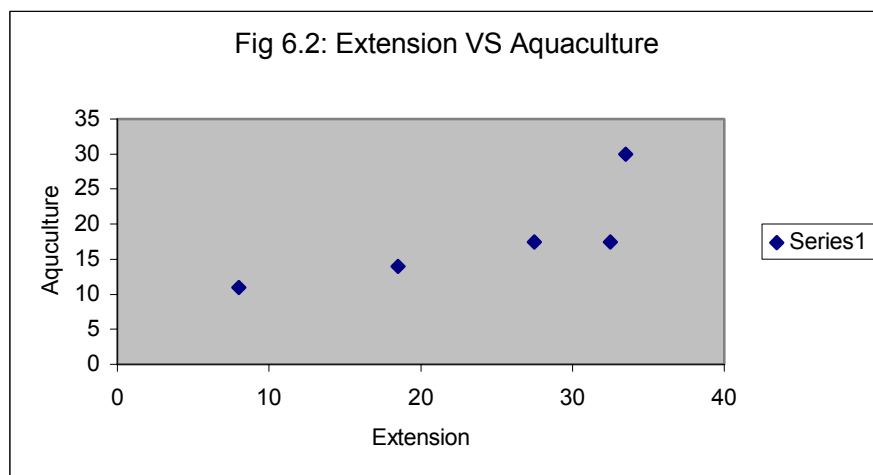
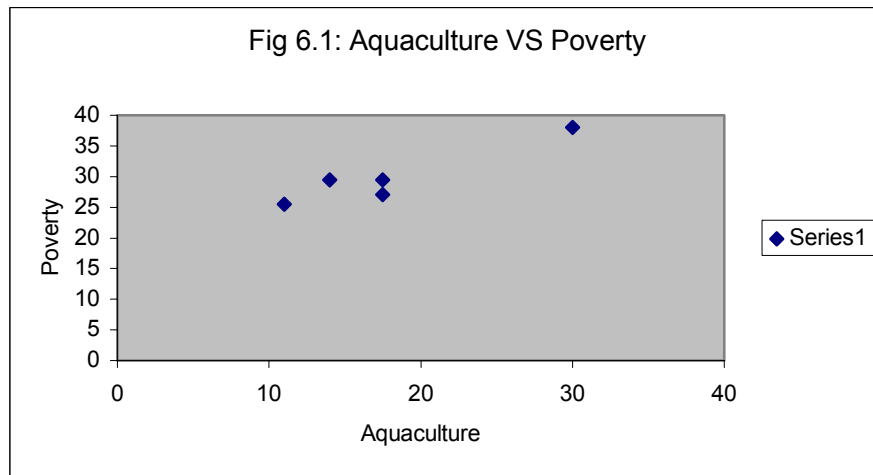
The rank/order of cases for **Poverty impacts** is presented in **Fig: 5.13**. It is seen that Model Village is positioned at the top, followed by NGO and Demonstration being closely positioned in impacting upon poverty in the communities under investigation. Control stood at the bottom with Trickle Down having a marginally higher position. It is important to note that the gap between Control and Trickle Down, with Model Village in particular being very high.

Now I will move on to the patterns between aquaculture: poverty; extension: aquaculture and aquaculture: social development which emerged from the rank ordering in the four different aspects under investigation and to look for consistent pattern.

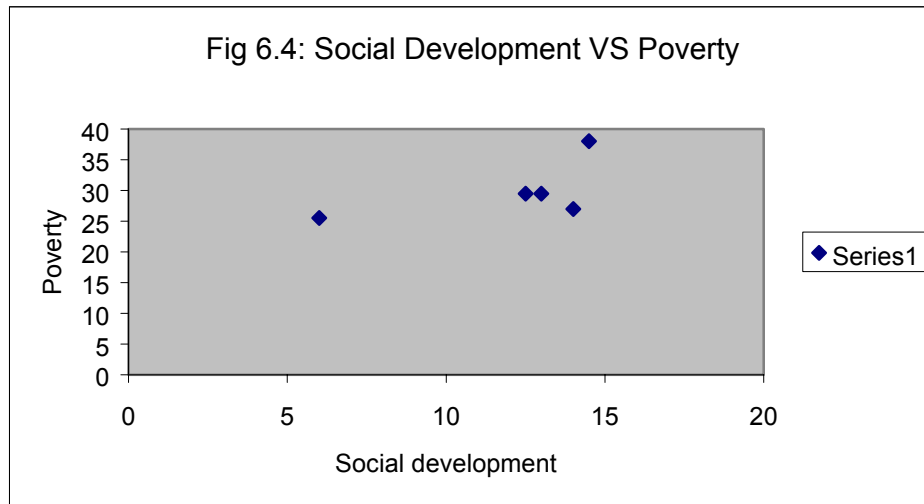
From **Fig 6.1** it can be seen that there is a positive relationship between poverty and aquaculture but this is only made possible to discern by the Model Village point. The study also indicated a positive relationship between aquaculture improvement and extension intervention (**Fig 6.2**). This has also been mentioned in a recent study of extension impact evaluation conducted by ICLARM and the DoF (Thompson *et al.*, 2000). Here Model Village is markedly advanced, but the relationship appears to hold over all four cases. In addition, it is seen that there is a positive relationship between aquaculture



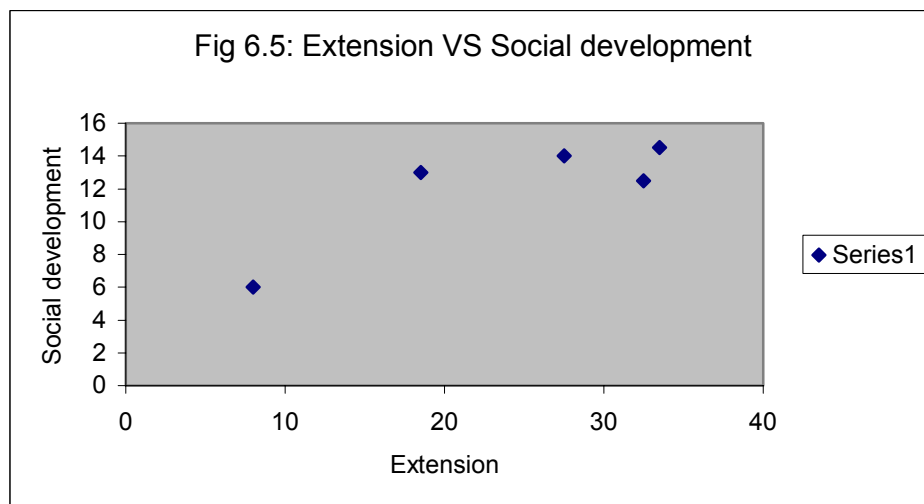
improvement and social development in the community **Fig 6.3**. Again, the relationship is true for all cases even though Model Village strengthens it.

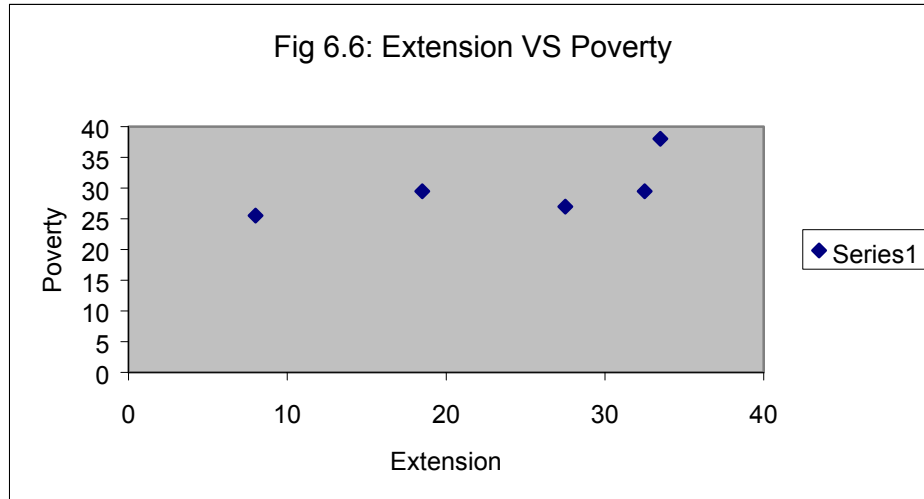


The study also indicated a positive relationship between poverty and social development as presented in **Fig 6.4** below, where the effect of Model Village is to strengthen an otherwise weak relationship.

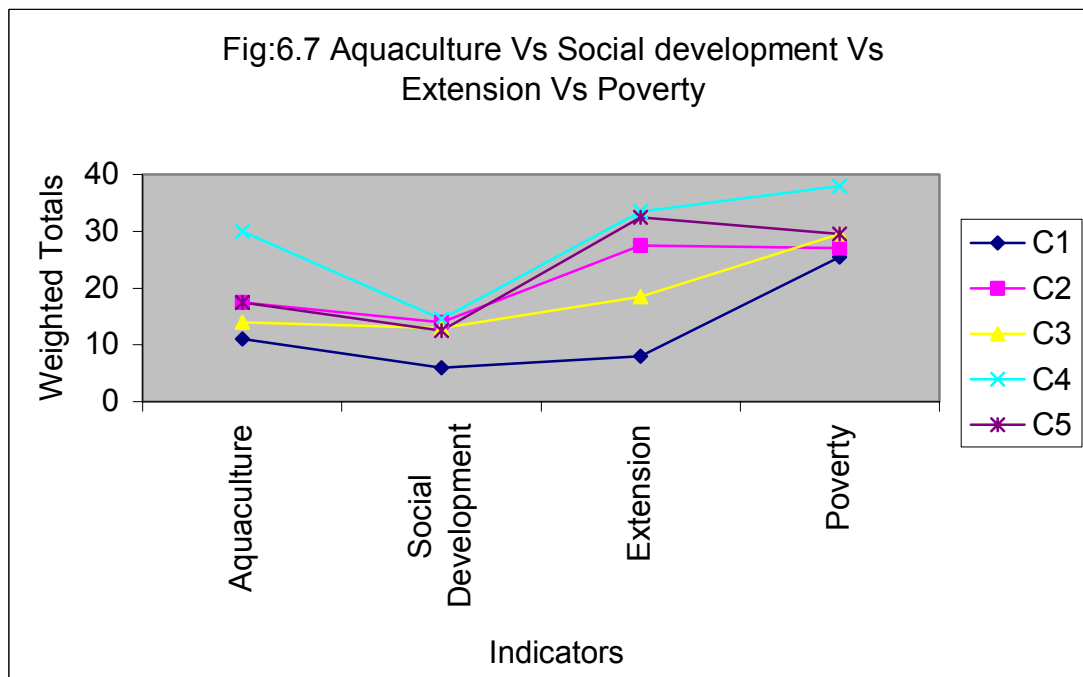


The study also revealed a positive relationship between extension and social development and shown in **Fig 6.5**. The question here is, however, which is causal? as a lack of social development may result in low external intervention or vice versa. The study also indicated a positive relationship between poverty and extension as is presented in **Fig 6.6** where again it is the presence of Model Village which provides any sense of that positive relationship.





**Fig 6.7** suggests that all the aspects go very much hand in hand with exceptions in poverty impacts in Trickle Down and Demonstration and social development in NGO. This supports the view that high aquaculture; high extension and high social development eventually bring about higher positive impacts upon poverty. Streeten (1994) also expressed similar views relating to development. Edwards (1996) commented that context is crucial in determining outcomes of development interventions.



What we now need to do is to tease out the possible causation of these findings that can be tested against fresh data or against findings elsewhere.

The following section sets out to identify parameters that make the difference, what Miles & Huberman (1994) suggest is ‘causal analysis’, and to match patterns of similarities and differences in aquaculture; extension intervention; social development and poverty. This will be done by what they further suggested as a rule of thumb, by checking raw data and by cross referring to relevant research studies and available theories in these areas, with particular reference to the Model in Fig. 2.4.

## **6.2 Possible Explanations**

### **6.2.1 AQUACULTURE**

The study findings indicated remarkable differences in aquaculture status across cases. The following indicators were the probable key determinants (see **Table 4.29**):

- Fish consumption
- Fish production
- Stocking density and species combination
- Use of inputs

Now an attempt is made to look at how extension; social development and wealth (poverty) impact upon aquaculture.

#### **Fish Consumption**

Fish consumption was highest in Model Village followed by Demonstration, NGO and Trickle Down respectively. There is an evident relationship between increases in production of fish and higher consumption. So that we might argue that, despite consumption being possibly determined by such factors as taste, familiarity, understanding

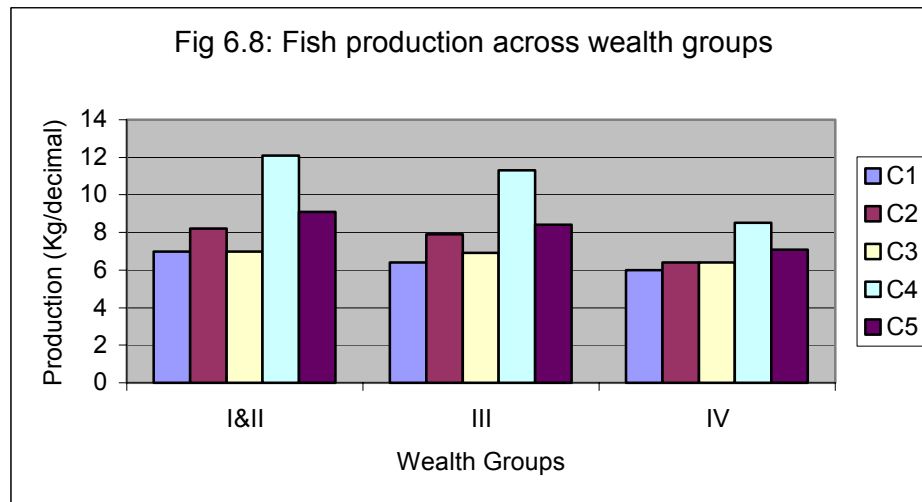
the importance of a diverse diet, nevertheless in the circumstances of this study the key determinant of consumption is production. Although there was a slight decline in fish consumption from 1996 levels, in Model Village, the overall amount was markedly higher compared to other cases.

### **Fish production**

The potentially significant determinants of fish production are water availability, stocking rates and species composition, and inputs. In relation to the former, seasonal ponds can be brought under fish culture for a shorter period than perennial ponds which can be utilised under different farming systems. Fish production is directly related to the period of fish culture since, the higher days you can keep fish, the higher production that can be achieved with management. Thus, according to Nyman (1987, p.30) '*the main limiting factor in fish farming is the total amount of water available and its distribution over the year*'. It is important to note that the average size of ponds was highest in Model Village (20 decimals) and NGO (15 decimals) and these achieved higher production compared to other cases. The study also confirmed that there is a relationship between pond size and wealth, with a prevalence of larger ponds being owned by wealthier groups. This in turn contributes to a widening of the gap between rich and poor since the productivity per household is to some extent related to the size of the ponds owned by each family. Although the study by Thompson *et al.*, (2000) demonstrated that larger ponds ( $>0.12$  ha) achieved lower production per unit area compared to smaller sized ponds ( $< = 0.06$  ha).

The study findings revealed that there is co-relation between wealth and fish production (see **Fig. 6.8**). The wealthier tend to achieve higher production which was also supported by Chowdhury *et al.*, (2000), but that the relationship is not as strong as might have been

expected. This must be due to the increased production of Groups III and IV from Model Village and NGO, probably caused by extension or social development factors.



### Stocking density and Combination of Fish Species

Stocking density and combination of fish species are also key determinants of increasing fish production. For instance, Model Village reported stocking the lowest densities among all the cases and the selection of fish species to fit in different pond niches was good, leading to highest production. Control, Trickle Down, Demonstration and NGO stocked higher densities compared to Model Village but since there was a fair selection of species amongst NGO, Trickle Down and Demonstration this contributed to a slightly higher fish production in those cases. On the other hand, both stocking at higher densities and the poor selection of species in Control led to the lowest fish production.

This study suggests that there is no relationship between wealth groups and stocking density, however, it indicated that the choice and selection of species of fish was to some extent better in wealthier groups. Thompson *et al.*, (2000) study pointed out similar views. But again, the selection of species amongst Group IV members in Model Village was reasonably good.

Other causes for different stocking densities and species selections must be sought in awareness, understanding and access to appropriate fish seed, which in turn are determined by extension activities and social development.

### **Use of inputs**

The use of inputs was highest in Model Village followed by Trickle Down and NGO, and thereby contributed to higher fish production. On the other hand this was just the opposite in Control and indicated low fish production. In semi-intensive fish farming, agro-based by-products can be used as fish feed eg. Rice bran, green leaves, grasses. Use of inputs such as mustard oilcake, and fishmeal are very expensive and most often, poor farmers cannot afford these feeds. However, at the current level of aquaculture in the study region, which is predominantly an extensive to semi-intensive type, high cost inputs are not required. Although overall the use of inputs is related to wealth, the study findings revealed that Group IV members in Model Village and NGO used inputs reasonably well and eventually achieved higher production. Since this did not happen in the other cases we may speculate that other causes such as lack of awareness and access to suitable materials may have profound impacts on the use of inputs.

From the above discussion it is clearly mirrored that Fish Consumption is determined to a large extent by fish production which is itself determined by both water availability, stocking regimes and inputs. Although all three have links to wealth status, there are very clear pathways into Social Development and Extension, linking to our Model of causal pathways in Section 2.8.1 that social development, extension and poverty have the potential to impact upon aquaculture production through links (5 & 7) information sharing and efficient utilisation of resources in Model Village and NGO achieving higher production, link (1) extension provided services to community in Groups in Model Villages building

human capital for technological innovation to increase production and access to credit, money from fish sales etc. invested in aquaculture, link (10). Finally, more organised farmers may be able to influence access to support or inputs, link (11), for example fish seed.

### **6.2.2 SOCIAL DEVELOPMENT**

So if Social Development has impact upon levels of Aquaculture practice we need to tease out the causal relationships. Findings of the current study showed differences between the cases in levels of a variety of aspects of social development. Below are the key determinants of the rank ordering of the case communities (see **Table 4.32**) in regard to their social development:

- Social structures
- External interventions
- Social capital

Now I will show probable linkages and relationships of social development to aquaculture and illustrate them below:

#### **Social Structures**

As argued in the sections on Aquaculture above, a possible factor influencing the key determinants of relative Aquaculture status is access to inputs. The key inputs are fish fry, various forms of fish feed and finance. These in turn are likely to be influenced by the prevailing social structures.

For example:

There might be a link between social capital and stocking, since the local fry traders deliver most fingerlings in the rural communities. Due to the large pond holdings by wealthier



community members they have more contact with these fry traders, representing more significant marketing interests for the fry traders, who are less able to cheat these farmers because of their level of knowledge and social status. On the other hand, poorer farmers have a lack of contacts and a poor knowledge in aquaculture; therefore, chances of being cheated are much higher. It is suggested that by enhancing social structures and relations with fry traders, possibly by extension intervention, these farmers can achieve better fingerling selection and ultimately higher production. Bebbington *et al.*, (2000, p.14) cited that *'social relationships and networks help poor people work together, share risks and resources, act collectively and build linkages with external agencies'* and this has been the case for NGO. Coleman (1988, p.107) cited that *'closeness of social structures is important not only for the existence of effective norms but also for another form of social capital: the trustworthiness of social structures that allows the proliferations and obligations and expectations'*. He further added that *'closure creates trustworthiness in a social structure'*.

However, the sort of structures that might have influence here are marketing groups, farmers' co-operatives and fish clubs, none of which were found in any of the study communities. On the issue of finance there were some credit groups, particularly in Demonstration and NGO. Interestingly Model Village had the lowest receipt of credit by Group IV members. This, by enlarge, runs counter to the use of inputs.

Krishna & Uphoff (1999, p.15) cited that *'villages having more "modern" infra-structural facilities might also expected to be more disposed to undertake development activities'*. Social structures might also provide more scope for development activities and therefore can impact upon people's livelihoods in many ways. Model Village had higher social structures and Trickle Down and NGO with moderate social structures. Since Trickle Down is close to the town centre, it is expected to give more scope for off-farm opportunities and

could have impact upon sources of income and on poverty (Mannan *et al.*, 2000). It is also important to note that closeness of Trickle Down to the nearby town might have encouraged BADC to grow potatoes in this community where farmers are expected to get higher price for their produce and eventually impacted upon livelihoods. Thus the higher level of Social structure that generates a ranking similar to that of Aquaculture (See **Fig.6.3**) might be impacting through a more general disposition to innovation.

### **Number of Development Intervention**

In the same way, the overall openness to innovation might be related to the level of other development interventions. It is possible that there is a relationship between the richness of development interventions and livelihoods options. For instance, Model Village is at the top with a large numbers of interventions; Trickle Down with moderate interventions and the provision of information, credit and other support services in the community; and NGO with moderate interventions with RDRS operating a comprehensive programme. The study specifically indicated that the number of development interventions in the Model Village, and specifically BADC to the Trickle Down community, has helped to sustain crop and fish production.

Demonstration with few interventions (See **Fig 5.10**) and Control, at the bottom, with the fewest interventions show an extreme deficit of information and poor services to the community (See **Fig 5.10**) and almost certainly thereby an inability to bring about aquaculture improvement.

There might also be a relationship of resource availability and the number of development intervention where, in Model Village community, the Fisheries Department was attracted to

intervene because of the greater number of ponds and in the Trickle Down village BADC because of good soil for producing potatoes.

Intervention can provide information and other inputs for development. Christoplos *et al.*, (2000, p.36) cited that '*access to information is the primary obstacle to poor peoples ability to choose livelihoods. Information is bound together in the structure of capital and power, which relates not only to immediate production decisions but also to wider questions of vulnerability, access to resources, and ability to choose voice requirements*'. Development intervention can increase people's awareness. The RDRS members through their organisation lobbied to bring IFADEP in for renovation of their ponds (link 11).

There might be a relationship between people's level of education and the concentration of development interventions that may have been reflected in Model Village, in particular. These cases are not very close to local services, but the number of interventions is high. Educated people might have pursued opportunities with development organisations. The number of development interventions might have given people more access to information on crops, health and nutrition, as might have been the case in Trickle Down, Model Village and NGO indicating comparatively better livelihoods.

Also the level of education can lead to higher involvement of more prestigious and higher value economic activities, as in Model Village, and possibly diversifying the economy of the community and higher impacts on poverty in the end.

Other studies in the recent past also indicated a positive relationship between the number of interventions/ extension and community development (Mannan *et al.*, 2000; Cox *et al.*, 1998).

## Social Capital

The determinants of Social Capital are time availability and attitude to interact, and level of education. Social capital was assessed on the basis of mutual support, networking; solidarity, reciprocity and collective actions among community members. Thus we might expect these to link into the key determinants of aquaculture improvement by information sharing.

Morris (1998, p.8) cited that '*social capital affects the economic system in two principal ways:*

- i) *through increased social networks, there is a greater probability of contacts between agents, making transactions more likely (this can be thought of as a kind of multiplier effects) and*
- ii) *through the enhanced quality of the relationships between agents, which makes transactions between agents more efficient and more probable. '*

This might be the case in Control and Demonstration, in particular, where relationships among community members were poor; solidarity and community cohesion was weak leading to low impacts upon poverty (links 7 & 5).

Or more generally through enhancing people's willingness to try new things and to take risks, relying upon solidarity and support in crises. The study indicated that Trickle Down, Model Village and NGO demonstrated signs of mutual support, trust and collective action. These might have opened up opportunities for better economic and non-economic activities in the community, which ultimately contributed, to overall community development. On the other hand, the perceived lack of trust, mutual support and collective action in Control and Demonstration, in particular Control, may have led to distinct impoverishment in social

development and might thereby, have restricted economic and non economic activity in the community and eventually had less or no impact on overall community development.

Krishna & Uphoff (1999, p.21) opined that ‘ *villages that show higher levels of collective action in one sphere of development activity also exhibit higher levels of collective action in other spheres*’.

The implications of social capital in development has been recognised fully. Development specialists have been putting emphasis on the creation and formation of social capital to the same degree, for example, physical capital and human capital in previous human eras. Since social capital can create similar impacts to physical and human capital (Coleman, 1988). Sen *et al.*, (1997, p.111) said ‘ *people know each other creates opportunities for collective action and mutual assistance, and for mobilising resources on a self-sustaining basis*’.

From the above discussion it is clearly mirrored that social capital has enormous value in community development, in particular for the poor and marginal members of the community who lack other capital such as physical, human and financial capital. And Hayward (1987, p.5) rightly mentioned that ‘ *rural development projects aiming at strengthening community should aim at strengthening the social solidarity, unity and cooperation between people*’.

From the above consideration it can be suggested that there is a relationship between social development and poverty, aquaculture and social capital formation and extension and social development which links to our Model of causal pathways in link (6) where social inclusion led to gifts in Model Village, Trickle Down and NGO; link (7) information

exchange in Model Village and NGO groups, and Trickle Down in particular; links (4 & 9), where interventions foster groups and networks, in particular in Model Village and NGO, with higher interactions and discussions about fish culture amongst people .

### **6.2.3 EXTENSION**

The study findings indicated differences in extension approach and their impacts. The following parameters are the key determinants (see **Table 4.34**) of rank order and are as follows:

- Aims and Objectives
- Targeting
- Methods of Training

I will now focus on how these extension parameters might impact upon aquaculture, and social development.

#### **Programme Objectives and Strategies**

The objectives of the programme can have significance influence upon overall achievements of the programme. As for example, the Model Village objectives were to enable farmers to open up choices, plan and act upon their own development, which impacted upon the ability of farmers to continue fish culture on a sustainable basis. This may have led to an improved willingness to try innovations in stocking and inputs.

Islam (1996, p.40) opined that *‘the essence of the community approach is that the people themselves plan and work together’*. And by ensuring participation of beneficiaries in development programme can eventually achieve sustainable outcome, as has been the case for Model Village.

On the other hand, Trickle Down objectives were to demonstrate semi-intensive fish culture technology and to develop a local extension agent. Duvel (1998, p.5) cited that *‘the “trickle-down” of information and influence does not occur to a significant extent, and concludes that the influence of opinion leaders is grossly over estimated’*.

Study findings elsewhere indicated that the cascade effects of trickle down of information and influence did not demonstrate notable results (Duvel, 1988; Christoplos *et al.*, 2000). However, the RD and the FF did tend to achieve higher production (Model links 1 + 2) but this had limited influence in increasing production of poorer people, for reasons outlined above (link 3).

Demonstration exhibited a prescribed technology and was found to have limited impact on overall aquaculture development in the community (weak links 10, 8 & 16). Morrice *et al.*, (1996) reported that demonstration farmers’ strategy had limited impacts. It is noteworthy that even the demonstration farmer reported that he had not advised any other farmer in 1999.

NGO’s objectives were comprehensive development and, in addition, they are trying to form groups and eventually people's organisations (link 4). There are some positive improvements such as increased fish production (link 7), sanitation improvement (link 6), decision-making improvement (link 6), networking of poor people in the community (link 4). There is evidence that Groups had been negotiating with other interventions (link 11) such as hapa breeding with UFOs and other projects for example, IFADEP in this case and thereby creating higher opportunities of livelihoods options. To a similar question the key informant, who is a Director of RDRS mentioned that *‘the overall objective is to strengthen the capacity of the groups as well as to increase production and income of*

*landless and marginal farmers and in the end is to achieve sustainable livelihoods’.*

However, the NGO approach still relied on a fixed, technological package and the principles of participation are slightly loosely applied.

Moreover, the formation of groups, fisher associations would help members in finding a platform for discussion both formal and informal, which could have immense affect on boosting social capital (link 4). For instance, the formation of fishers community in Model Village and formation of groups in NGO seem to have improved people’s interaction and eventually helped strengthen people’s bonds for example, sharing information on aquaculture as indicated by women members in these cases (link 7). In relation to the Model Village approach to extension, Chowdhury *et al.*, (1996, p.484) mentioned that *‘the flexibility of the community extension approach and the sharing of activities have resulted in the development of stronger relationships between farmers in the model village and between TFO’s and NFEP staff and the farmers. With farmers highly motivated and adoption level of most basic pond management recommendations has been very high’.*

The role of networking has been strongly stressed in recent developments of concepts of social capital. Social networks can have profound impact on learning (OECD, 2001) (link 7). Again, from recent experience in working with fish farmers’ groups Simpson (1998, p.52) wrote that *‘farmers’ associations served as a vital support network for their members. Associations approached government officials and private landowners to secure new areas for expansion of aquaculture system. They jointly dealt with theft problems and on occasion, harvested each other’s pond to limit excessive takings by extensive kin networks. Through their associations, farmers increasingly began to become involved in other productive activities.’*



For links (6 & 8), a recent NFEP livelihoods review (DFID, 2000) cited that *'village level informal linkages are probably the strongest with extremely poor people relying, in times of stress and vulnerability, on friends and neighbours whilst the relatively better off are more like to depend on patronage from rich.'* Edwards (1996, p.8) was referring to links (5 & 7) when he cited that *'linkages are important for many different reasons: learning, influencing, resource mobilisation and communication. Strong linkages which are properly used are one of the key to both scaling up and sustainability'*.

Researchers' recent experience in small-scale credit in aquaculture also suggests that Bank officials become more motivated in providing credit in Model Village since they can serve more people in a short time where most farmers are trained (link 12). In addition, the linkages between the local fry traders, school teachers and banks has created more interaction and has helped strengthening social capital and possibly other economic activities as well in the former case (link 4). While mentioning the dissemination of fish culture information, Sen *et al.*, (1997, p.110) cited that *'the development of local networks to disseminate information should thus be encouraged'*.

In addition, the formation of fish farmers' community groups have helped mutual support for learning and other interactions in Model Village and NGO indicating higher social capital such as trust, solidarity and collective action which did not happen in Control, and Demonstration, in particular (links 7 & 9). This interdependence of people in their own development was highlighted by Byrne (1999) when he cited that *'personal freedom and the development of individuals can only occur in mutuality with others'*.

From the above discussion it is clear that the overall social development impacts appeared to be wider in Model Village and NGO's approach to extension. Commenting on Model

Village, Islam (1996, p.40) cited *that 'it is also envisaged that, should the group prove to be well motivated that it will be used for the integration of other development activities such as rice fish, dyke cropping. An existing group would similarly be a useful base from which other sectors, such as, primary health care organisation could work'.*

Therefore extension with both economic and social benefit can discharge higher benefit overall. Christoplos *et al.*, (2000) expressed similar views.

### **Targeting**

Targeting is an important determinant of the outcomes of development programmes. For example, Model Village targeted the whole community to discharge benefits of extension on an equitable basis. This possibly worked well, as the poorer section of the community were able to get involved in improved fish culture, leading to higher production compared to Trickle Down and Demonstration, in particular. Inclusion of poor people in particular, by Model Village and NGO has helped increase their knowledge (human capital) and transformed it into economic benefit. Targeting of this kind may have led to more equitable fish production, in particular in Model Village and, in other cases that focussed upon one group or another probably discharged disproportionate benefits leading to lower production over the whole community.

In addition, in Model Village and NGO, females have also been involved in aquaculture through this programme, which might influence participation on aquaculture and decision-making as this study showed in these two cases. The above statement was also supported by a NFEP social audit study conducted by Eggen in 1998 while reviewing the NFEP project. Involvement of women in the programme can empower them. In addition, NGO

also provides opportunities for women to become aware of health and nutrition, human right and women's rights as part of social development, which is possibly helping women's overall development and may have been reflected in their openness to outside intervention and the overall health situation in this community.

Trickle Down has targeted mostly medium sized, male farmers, and thereby probably discharged disproportionate benefit to those members of the community. Thus Lewis (1997, p.544) cited that '*if aquaculture development in Bangladesh is promoted with out targeting, better off farmers will benefit disproportionately*'. In a recent study ICLARM (Thompson *et al.*, 2000) reported that Trickle Down, formerly known as TDES, targeted male farmers with larger land holdings. The study also suggests that TDES selected larger ponds and farmers with a higher education level, which probably led to a limited influence on the resource poor farmer in the community, kept poorer people away from direct extension contact and thereby lowering the chances of accessing information to these groups.

Demonstration targeted poor and mostly male farmers only. This might have influenced fewer people in the community for sharing of information and exchange of ideas with the result of lower production and consumption. As usual single approaches are always expensive and the sharing of information across community members can be low as in the case of Demonstration, in particular, thereby discharging less benefits in terms of reaching fewer people.

Targeting may also be related to the resource availability, targeted to where a large number of farmers have perennial ponds, in particular, in Model Village, whereas the NGO

extension targeted comparatively remote villages with possibly higher numbers of poor people.

Indeed by targeting groups/community, human capital for a large number of farmers can be built. Christoplos *et al.*, (2000, p.37) cited that *'the development of human capital has been cited as one of the most important factors in securing rural livelihoods'*. This was the case for Model Village and NGO where groups/community are being targeted and human capital for a larger number of people has been built compared to the other Cases. The long-term effect of human development has been emphasised by Sen (1999, p.10) thus: *'the effect of human capital for increasing long-term economic growth is well known. In that capacity, development of human capital has strong income-poverty reducing effects'*.

### **Methods of Training**

Methods of training have been important aspects in transference of information and generation of self-esteem. Use of a variety of methods can improve transfer (Rogers, 1993). Model Village is providing training in the community that matches with the aquaculture season. The principle, which coincides with the objectives, is that farmers are given technical options and a package instead. This approach allows more opportunities for practical demonstration in a real context. However, the use of methods and extension material was moderate. As OECD (2001) rightly mentioned that *'the role of education and learning in generating new technology and innovation received more emphasis'*. Similarly, Simpson (1998) wrote that *'farmers should not only know, what to do, but why and how it works'*. This has possibly strengthened farmers' self-confidence and encouraged them to be independent. The ultimate results are probably building self-esteem and in the end higher production. This was also expressed in the study findings as follows:

Model Village also recorded higher use of inputs indicating direct impact of training. Therefore, by increasing knowledge, the frequency and use of inputs can be increased which eventually can lead to higher production (Islam and Mardall, 1999).

Chowdhury (1999, p.7) quoted that *'it is clear that the MFVP community based approach made a significant improvement on pond culture techniques in the villages. There is a sustained increase in fish production, management practice and attitude. It can be predicted from assessment that from this approach this programme benefits a greater number of poor and marginal farmers. The study shows that the increased fish production is having an impact on family nutrition and economy. This is a positive indication of the continued use of the MFVP extension methodology for poor and marginal farmers specially. Through aquaculture development and optimum use of water resources the rural livelihoods may change positively with long-term sustainability'*.

Moreover, NFEP Annual report (1998, p.4) cited that *'the MVP has sustainable impact on fish production, income and nutritional levels of farmers'*

Trickle Down and NGO, to some extent, also provided opportunities for learning in the local environment since in both cases there is provision of a central base as well as training at the community. The field workers of RDRS, the NGO chosen for this study, have concentrated on technology/product rather than the process by extending a sort of fixed technology, providing limited flexibility for the users that might have restricted farmers' exercise of options. This might have given people less opportunity for learning, as Pretty (1995, p.1249) cited that *'technologies are not sustainable: what needs to be made sustainable is the process of innovation itself'*.

Technologies need to be appropriate for farming communities since Drewes (1987, p.19) wrote that *'aquaculture training needs to be adjusted to these demands to provide rural poor with access to technical, economic and management skills and knowledge of fish-farming'*.

For Trickle Down, UNDP (2000, p.10) cited that *'based on principles of "learning with playing" fish culture game cards were developed as extension tools'*. These may have led to a greater interaction and eventually community learning. Indeed, the use of extension materials was good in Trickle Down and NGO and training methods were good in NGO respectively.

In a study conducted on NGO by Nath (2000, p.3) he mentioned that *'training modules have been developed by RDRS as per the project needs and most of the contents included in those are relevant'*. RDRS has developed some modules of its own, but these were developed or expanded or, for certain disciplines, created a new to serve the needs of the specific projects'. He further added that *'RDRS has its capacity to organize residential training courses and all relevant training materials are available in the training centers'*. Again Nath (2000, p.7) mentioned that *'all training courses are held in different training centers, preferably closure to beneficiaries houses. Participatory methods are followed in the classroom and there existed scope to visit demonstration plots to provide practical training to the participants'*. He further added *'it has been observed those beneficiaries perceptions on new and improved farming practices have significantly developed. Every participants was found to be aware on how to initiate alternative employment opportunities in improving their living standard'*.

Earlier Study findings in the case of NGO, RDRS Evaluation Report, 1999 (p.11) also cited the following comments:

*'It is expected that fish production would increase more as the adoption rate of fish culture technology will increase. The inputs of fish culture are locally available and easily manageable. Many neighbouring farmers found interested and have started fish culture in their own ponds'.*

and

*'Aquaculture proved as income and employment generation activity and ensuring household food and nutrition security'.*

A larger number of farmers in these communities had been trained by extension and therefore, provided greater opportunities of sharing and exchange of information in Model Village and NGO to establish self esteem among community members, leading to higher production (links 1, 7 & 2). Van dan Ben & Hawkins (1988) mentioned that *'farmers learn most from their own action, from observing others action and from discussing cause and effects'.*

The overall level of education can have an influence upon fish production. In Model Village, in particular, amongst both male and females was higher compared to other cases, and might possibly have led to a higher fish production. In Trickle Down and NGO the educational and training status which was fair compared to Model Village might probably have led to moderate improvement in fish yield, but in Demonstration and Control, for example, where the level of education was very poor may have contributed poor fish production in these two communities.

Level of knowledge and access to information can thus influence upon formation sharing

and eventually adoption of improved practices to achieve higher fish production and thereby can impact upon fish consumption and income and it can be improved through extension intervention, such as, the for Model Village and NGO where in particular, Group IV members were able to increase their fish production, consumption and eventually their income. Levels of education have a significant positive relationship with fish production (Chowdhury *et al.*, 2000).

From the above consideration it can be suggested that there is a relationships between aquaculture and extension, extension and social development and social development and poverty as shown in Section 2.8.1 in our Model of possible causal links, thus links (1) and (2) transfer of information for increasing production as in Trickle Down, Demonstration, Model Village and NGO and links (4), (7) and (2) interventions foster Groups/ networking in Model Village, NGO and Trickle Down and links (6) and (10) where social inclusion in particular in Model Village and NGO led to more exchange of information, exchange, gift and building self esteem.

#### **6.2.4 POVERTY**

Now we need to look at the causal routes to poverty. The study findings pinpointed some differences in levels of poverty impacts across cases as can be seen in Chapter 5. The following are the key indicators in determining rank ordering for poverty (see **Table 4.38**) and are as follows:

- Health and medical preferences
- Latrine usage trends
- Food levels
- Participation through aquaculture



Now I will gauge the linkages between poverty parameters with aquaculture improvement, extension and social development. These are as follows:

### **Health and medical preferences**

There are key measures of levels of poverty in this study. So we need to consider what determines this indicator.

The following factors can influence upon health and medical preferences.

**In the first place**, resource availability is an important factor in determining health and medical preferences where Group I & II members in particular, in all the communities reported having improved medical facilities and going to specialist surgeons even in a distant place. Access to visiting specialists are also related to wealth conditions in Trickle Down, Model Village and NGO and Group IV members in particular among all cases are dependent upon village doctors. The study provides limited evidence that cash earned from fish sales was invested on medical treatment. In Trickle Down a few respondents from Group III indicated doing so. The potential of aquaculture in impacting upon health and medical preferences is indicated but not proven.

**Secondly**, access to medical support can have positive health implications. The study also indicated that closeness to health facilities could impact upon health and medical preference, as in Control and Demonstration, in particular, where female members from Group IV visited nearby hospitals during health hazards. However, such access is a product of location and not extension intervention (the basis on which cases were chosen).

**Thirdly**, nutritional status is a prime determinant of health and is dependent upon a number of factors such as, seasonality; wealth; production; wild sources and gifts from others. In turn, accumulation of wealth is dependent upon land holdings and employment opportunities.

The land holdings across cases amongst Group IV members were similar. However, crop diversification is different in Trickle Down and NGO in particular, as diversification of cash crops might have led to better cash income. In Control crop diversification is particularly poor.

The main determinants of nutritional status are food levels which themselves are indicators of poverty and will be dealt with later.

**Fourthly**, health is related to hygiene and hygiene is closely linked with wealth and availability of latrines as well. Group I&II members across all cases have better housing and cleanliness compared to Group IV which also determine health conditions of people. In addition, personal hygiene practice, in particular disposal of solid waste, can have significant health implications. The incidence of intervention and the efficient use of resources might have contributed to a better position in the former Groups.

**Finally**, level of education can have significant health implications, as indicated in Control and Demonstration, in particular, leading to poor health conditions compared to other cases, whereas knowledge and awareness has been increased through other intervention, in particular, in NGO with higher sanitation and fair health conditions indicating a positive impact of NGO intervention. Frankenburger *et al.*, (2000, p.10) also mentioned that '*high*

*levels of illiteracy not only affect economic opportunities for the poor but also can have significant health implications’.*

Good health is also linked to access to safe drinking water. The overall drinking water situation was better in Model Village, Trickle Down and NGO and was comparatively poor in Control and Demonstration respectively. The impact of intervention and the efficient use of resources might have given the former cases an advance position.

The determinants are primarily due to latrine status, which will be discussed below. But may also be linked to education and extension and supports the importance of extension interventions.

### **Usage of latrine**

The study findings indicated better usage of latrines in Model Village, Trickle Down and NGO respectively compared to Control and Demonstration.

There is no evidence that increased income from fish sales has been invested to install latrines. The following factors might have impacted upon the usage of latrine in the communities.

The study suggests **firstly**, that the usage of latrines might be linked with increased health awareness resulting from development interventions, in particular through NGO support as in Trickle Down and NGO, where the involvement of NGOs might have influenced improvement in latrine usage.

**Secondly**, improvements of latrine might also be dependent upon utilisation of resources both physical, such as land, and human resources, such as education. Villages with higher education and better access to extension service can also accelerate the pace of diversification of agriculture activities, for example potatoes and other cash crops grown in the RDRS village might have given better income and improvement of livelihoods in particular, in Model Village, NGO and Trickle Down respectively.

**Thirdly**, access to credit might have an impact upon the usage of latrine. For instance, in Trickle Down there was a modest level in both male and female credits amongst Group IV members. It is worth mentioning that the cumulative credit recipients in 1999 for males were lowest and it was at the second highest levels in the case of females and might have assisted in some income generation and eventually to meet basic needs. Access to credit would help members to higher income earning opportunities and probably thereby could have more affect on poverty. Access to credit can be increased through extension intervention, in particular, by NGOs.

Therefore the determinants of improvement in latrine are resources, presence of development interventions and NGOs in particular.

### **Food levels**

The potential determinants of food levels in our study context are:

- Seasonality
- Production
- Food purchase
- Food from other sources;

- Wage labour;
- Safety nets.

Now I will attempt to establish relationships between food levels and aquaculture improvement, extension and social development as follows:

From the cross case comparison it is seen that the food situation was better in Model Village, NGO and Trickle Down respectively. Control and Demonstration Group IV members reported to suffer from food deficit from 3 to 6 months respectively.

**Firstly**, food production is linked to land availability and use of farming inputs. The average land holdings among households in Model Village, and NGO were higher compared to other cases. But the average land holdings amongst Group IV were similar ranging from 0.75 acres as highest. However, increased numbers of intervention might have created higher opportunities for the efficient use of resources. Villages with higher education and better access to extension service can also accelerate the pace of diversification of agriculture activities, such as potatoes and other cash crops grown in the RDRS village might have given better income and improvement of livelihoods and frequent contact with other officials as the Trickle Down, Model Village and NGO.

If we look at the consumption of fish amongst Groups in our study communities we can see that increased production of fish indicated higher consumption in Model Village, Demonstration, Trickle Down and NGO respectively. Therefore, higher consumption of fish by households certainly impacted upon family nutrition as reflecting physiological needs and health condition reflecting security needs. Sound health might have impacted upon poor people's working abilities in Model Village, NGO, Trickle Down and Demonstration respectively and therefore, would impact overall on sustainable livelihoods.

Fish consumption is also dependent upon wealth group, since the rich had higher production. But it is important to mention that poor people are mostly dependent upon pond fish production and fish from natural sources, being unable to purchase fish in the market. Increased consumption of fish possibly contributed to increase nutrition and good health, as is the case in Model Village, NGO and Trickle Down. The Control village indicated lowest fish production. The low fish production has potential to impact upon nutrition and on health and indicates a distinct poor health condition in Control. Nutrition can directly affect health and eventually poverty (Edwards, 1999, Frankenburger *et al.*, 2000). Mannan *et al.*, (2000, p.63) also cited that '*nutrition affects poverty*'.

In addition, increased fish production led to some sales, in particular, Model Village (72%) and NGO (39%) and eventually contributed to household income. It is worthy mentioning that increased fish production amongst Group IV members had substantial impacts upon these Groups and they have been producing fish on a sustainable basis both for household consumption and for income and eventually impacting upon their livelihoods on a sustainable basis. Sen *et al.*, (1997, p.115) cited that '*fish from small scale aquaculture can contribute to improved food security, specially transitory food security*'. In particular, this might have influenced building self-esteem thereby encouraging a possibly shift from subsistence farming towards commercial farming in the near future as has been indicated a sustainable fish production in Model Village. Thus the NFEP, Annual report 1998 cited that '*the MVP has sustainable impact on fish production, income and nutritional levels of farmers*'. Again, RDRS Annual Report 1999 cited that '*aquaculture proved as income and employment generation activity and ensuring household food and nutrition security*'.

**Secondly**, food purchase is related to sources of income, availability of foods and access to markets. Out of which source of income is the most important which again is dependent

upon several factors such as waged labour/off farm opportunities, loans or credit, other cash crop and trading. The study also indicated that, in Demonstration and NGO, people from Group IV bought food by selling fish showing a very strong relationship between aquaculture and food levels. There is evidence that aquaculture (NGO) has provided community members with employment opportunities in renovation of ponds which in turn will have had an impact on household income. Again increase in fish production can eventually increase in household consumption of fish and or income.

**Thirdly**, sources of wage labour can also have significant influence upon income and eventually on livelihoods of people. The closeness to the town might have provided people with income diversification opportunities such as rickshaw pulling and petty business as indicated in Trickle Down, in particular. On the other hand, extreme dependency on poorly paid agriculture wage labour has forced people to low income as is the case in Control and also selling labour in advance in crisis may lead to a deficit in food levels. Furthermore, lack of education and training has been identified as a key factor in livelihoods diversification (Ellis, 1998) as has been the case for Control in particular, with low income and high incidence of poverty. Mannal *et al.*, (2000) said that the degree of poverty of individuals and households is dependent upon the context they live.

**Fourthly**, food levels can also be positively affected by the provision of safety nets and increased social capital and it is evident from the Phase 1 findings that Group IV members in Trickle Down have been helped by neighbours giving food in crisis. The study noted that there is evidence of exchange of fish as gifts between communities indicating improved social relations across Trickle Down, Demonstration, Model Village and NGO which to some extent might have helped to improve food levels.

Model Village and NGO indicated higher social capital, which has led to mutual benefit enhancing chances of both economic and social benefits and thereby impacting upon people's livelihoods. The higher levels of social capital might have helped poor people to escape from risks such as a communal marriage and help in a crisis as in Model Village and NGO, and cash money and food as indicated by Group IV members in Trickle Down. Lack of social capital in particular, in Control, excludes people from information sharing thereby reducing productivity in aquaculture and made vulnerable to increased risk, as one example can be given of not sharing irrigation water because of no such structures for liaison. This might have impacted upon, in particular, Control members since most Group IV members are agriculture wage labourers and possibly could not find time to interact with others leading to poor accumulation of social capital. This may have perpetuated vulnerability and low chances of collective action and thereby, Group IV members, in particular, reported selling their labour in crisis.

Improved social capital can enhance both economic and non- economic benefits (Coleman, 1988), as might the case for Model Village, NGO and Trickle Down with higher social capital and higher levels of poverty impacts as a whole. Dhesi (2000, p.203) opined that '*a community's ability to cope with stress, engendered by the development processes, depends upon its material well-being and its stocks of social capital*'. The provision of safety net provision may have influence upon food levels as in NGO indicated to receive relief.

**Finally**, access to credit might have helped in extra income earnings for the households and be made available for satisfying other needs. In addition, it might help in empowering them, in particular for women, for example, showing the highest increase in decision making between years in NGO and in the end can met higher levels of needs. According to Annual Report 1999 Nath (2000, p.24) wrote '*women having access to credit and*



*involving themselves in running micro-enterprises increases their confidence and assertiveness. It will take time to achieve roles like men but very positive starting point that now they can share their ideas, can make suggestions to their husbands, can make decisions on household expenditure, children's education and on participation in other family well-being.'* Access to credit also helps women's empowerment process and thus UNDP (1998,p.4) stated that *'this is seen as a major step forward in women's empowerment-making them economically more independent and strengthening their bargaining position in the household'*.

In the middle of this Chapter we have seen that wealth is impacting upon aquaculture productivity and simultaneously, wealth also has a range of routes to impact upon the maintenance of poverty but it is not the only determinant.

### **Participation through aquaculture**

This is a completely separate indicator of poverty.

Phase 1 findings indicated that the involvement of Group IV women was highest in Model Village followed by Control, Demonstration and Trickle Down. But it is important to mention that NGO made the highest improvement in participation on aquaculture between the years.

The study suggests that there is a positive relationship between women's involvement in training and their increased participation in aquaculture, which is clearly seen in Model Village and NGO, in particular. In addition, participation in aquaculture was also related to wealth group categories and is reflected among all cases. The increased participation might have been the cause of increased use of inputs as seen in Model Village and NGO, in

particular and eventually may influence fish production. In addition increased involvement of women may lead to increased fish consumption. Involving women in aquaculture as an income generating activity and increasing their roles in decision making can have a positive effect (Eggen, 1999). Again, RDRS review document, 1999 cited that '*due to increase in income and technological knowledge confidence of women has also increased*' indicating women's empowerment in the household and in the community.

The determinants of participation on aquaculture are wealth group and increased awareness. Involving women in aquaculture by training can increase awareness and their participation in income earning activities.

In summary, Phase 1 findings suggests that there is a direct positive relationship between aquaculture and poverty which is linked to our Model in section 2.8.1, (link 3 via 2) by supplementing fish in their diets and also giving cash income which can eventually be used for other livelihood options. Fish production can be increased (link 2) by creating awareness and by providing extension and training support (links 1, 4 & 7) to the community. Extension can therefore enhance increase in fish production and income thereby on food levels and on poverty. Moreover, social development (link 6) can also impact upon coping in crisis as demonstrated in this study.

### **6.3 THE WORKING EXPLANATIONS**

In synthesising the above linkages it is necessary to remember that they may be fortuitous or even spurious. The outcomes of the same interventions might be quite different from one context to another. The patterns, which resulting from such interactions between contexts; interventions and livelihoods are dynamic, diverse and complex. Nevertheless, the patterns

that emerged by ranking cases according to the impacts on aquaculture; extension; social development and poverty though complex can help us to understand what is happening. From the above discussion the patterns revealed from the data from various cases and from cross case comparisons can enable us to tentatively establish a working explanation.

It is clearly reflected that the nature of the extension intervention certainly has impacts upon increasing aquaculture production. But in its own this does not affect poverty. External intervention can increase the technical ability of people but without emphasis upon targeting and fostering social development it is the better off who benefit most. More participatory methods seem to improve transfer, facilitate co-learning and eventually help building people's self esteem. Involving males and females, forming groups and fish farming communities by interventions can help build social capital. Formation of social capital can increase social cohesion and improve well being. Moreover, social capital can impact upon both the economic and non-economic benefits of all, which can be seen from the earlier discussion. Moreover, extension with both economic and social dimensions seems to have discharged higher positive impacts, in particular in poverty reduction. This study so far has illuminated the impacts of interventions across various Wealth Groups and has differentiated extension approaches. In particular it has highlighted that communities with poor social development interventions had a worse poverty status.

The study generated the following specific explanations as follows:

- There is a positive relationship between aquaculture and poverty. There is clear evidence that aquaculture has helped to increase fish production thereby consumption, which has direct implications on food levels and on health. In addition the evidence supports the contention that aquaculture can also increase income by increasing fish sales, which income can also be spent on buying

alternative foods, medical treatment and for investing in crop cultivation. *But on the other hand, better offs with their better, larger pond and higher levels of education can possibly achieve higher production.*

- There is a positive link between the kind of extension approach and aquaculture improvement. In particular, there is evidence that by targeting a broad section of people aquaculture improvement impacts positively on the poor. It was seen that by providing training to farmers, their levels of knowledge has increased, in turn leading to better selection of species, higher use of inputs and eventually achieving higher production on a sustainable basis. There is also evidence that extension is assisting farmers in trying out new ideas such as replacement of fast growing fish species. *But extension approaches needed to engage different wealth groups, excluding none, in order to build a problem solving approach (Model village rather than Demonstration farmer).*
- There is a positive relationship between social development and aquaculture improvement in the community. There is evidence of fish produced being given away, which is certainly increasing social capital. The formation of groups and community fishers has increased interactions and information sharing, provided opportunities of mutual benefits, seeing others doing and learning. The local fry traders can help in better selection, distribution of fish species and fish culture inputs, thereby can enhance fish production. *But the large pond owners still get a better service from fry traders than individual small pond owners.*
- There is a positive relationship between social development and poverty. It is reflected in the study that access (closeness) to health and medical facilities has been increased with the establishment of medical facilities. Closeness to the local population centre has increased off-farm opportunities and therefore enhanced income. Increased social capital can impact upon vulnerability for poor people (by

giving food or cash in crisis or for a daughter's marriage, or illness in the family).

Access to credit might have increased the usage of inputs for fish production and other income earning opportunities and may thereby improve sanitation. The number of different external interventions can assist in providing a variety of information and in turn assist in providing a range of livelihoods options. *But by far the most significant evidence is of a negative kind, from the control case, where the lack of social development went hand in hand with poor aquaculture, no extension intervention and highest levels of poverty indicators.*

- There is a positive relationship between extension and social development. It is reflected in the current study that increased awareness by extension has increased people's wider awareness. Formation of groups/farmers' associations increases solidarity among members and helps liaison with other development agencies for seeking livelihoods options. Simultaneously, development agencies are also selecting these groups to work with as an established platform. This network can help information sharing. For women, the formation of female credit groups, women's training in aquaculture and other income earning activities have increased their participation in decision-making. The study also indicated that remoteness (context/physical position) could impact negatively on social development (Control). *Remembering that it is not clear whether social exclusion leads to poverty or stems from it or is a vicious cycle.*
- There is a positive relationship between extension and poverty. By targeting poor people, extension can build upon human capital through fostering knowledge on fish culture, crops and eventually on food levels and income. In addition, it can increase awareness on health issues and thereby on poverty. It is also seen that women's participation on aquaculture and other income earning have also enhance decision making in other household activities. *But, as can be seen from NGO, the*

*main point of progress is to work in all ways to overcome the dependency relationship of the farmer on the extensionist.*

In all of this, it is also important to remember that these tentative conclusions could result from one or more of three possible causes. **Firstly**, they may result from the external intervention itself, validating the research, or **secondly**, from the way that those responsible for the interventions selected the communities that were to be used, leading to self fulfilment, and **finally**, through some fortuitous co-incidence. Therefore, the above working explanations needed to be tested with the findings from other communities that exemplified the five intervention approaches, gathered in Phase 2, in order to either confirm or reject those explanations. These will be discussed in detail in **Chapter 7**.

## CHAPTER 7: SUMMARY AND CONCLUSION

This chapter sets out firstly to draw upon the summary outlined in Chapter 6 and accept or reject the working explanations constructed there. Then a precise evaluation of the research and its contribution to this field of enquiry in relation to the proposed working hypothesis that initiated this study will be made. Thirdly I will pin point some areas needing further research and development of understanding. Finally I will conclude this chapter by putting forward some suggestions for the improvement of current approaches to development in the Bangladesh fisheries sector.

### 7.1 Validation of the Working Explanation

The possible indicators, which determined the differences in impact across cases have been identified and are presented in Chapter 6. The rank ordering of the cases, based upon these indicators, enabled an outline of theoretical propositions/working explanations to be put forward. Next it is necessary to verify and validate those explanations by checking against fresh data from Phase 2 - a similar, representative set of five cases that would support comparison - since as Denscombe (1998, p.212) mentioned *'various explanations and themes emerge from the early consideration of the data, the researcher should go back to the field with these explanations and themes to check their validity against "reality"'*.

Therefore, the process for the selection of representative communities for each of the five cases on which Phase 2 data was to be collected was undertaken according to precisely the same criteria and procedure as employed in Phase 1 and described in section 3.

Thus the question posed at this point is, are the causal links established in Phase 1 real ? If they are real we would expect Phase 2 cases to yield similar prioritised indicators, rankings and relationships. Alternatively, if they are not real then we might expect to see the relationships contradicted in Phase 2 communities.

Thus, if similar results occur in the representative set of cases in the Phase 2 investigation, the earlier findings can be considered to be robust (Yin, 1984) and will either uphold the theoretical proposition built in Phase 1 or, if not matched, will reject it. The rank ordering of cases based upon the key indicators, together with exploration of the explanatory relationships will be presented in the forthcoming section.

#### **Phase 2 Case Rank ordering:**

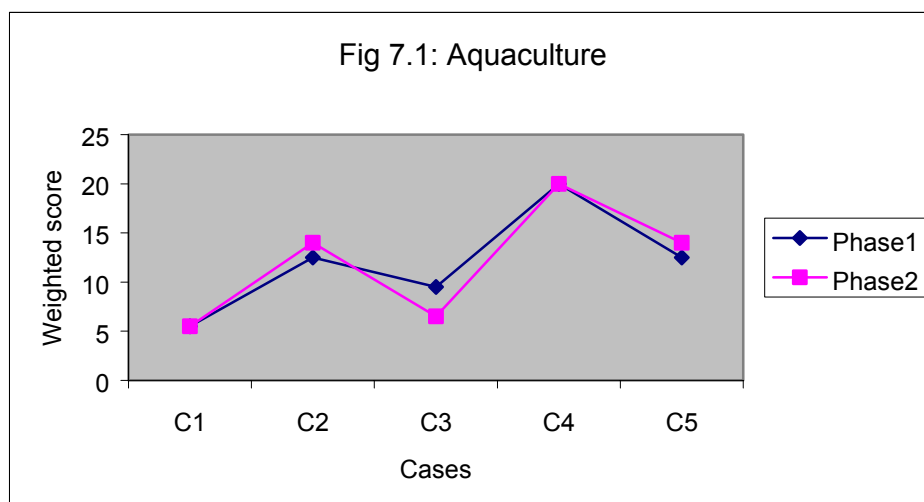
Tables 7.1; 7.2; 7.3 & 7.4 represent the rank ordering for aquaculture; social development; extension and poverty. The rank ordering is for the key indicators, which made the differences in case rank ordering in Phase 1. In addition, comparisons of the amalgamated data from those indicators for Phase 1 and Phase 2 communities are presented graphically as follows:

**Table 7.1: Summary of Aquaculture Status**

<i><b>Parameters</b></i>	<i><b>CASE 1</b></i>	<i><b>CASE 2</b></i>	<i><b>CASE 3</b></i>	<i><b>CASE 4</b></i>	<i><b>CASE 5</b></i>
Stocking	2	3	1	5	4
Input use	1.5	3	1.5	5	4
Fish production	1	4	2	5	3
Fish consumption	1	4	2	5	3
<i><b>Total Weighted Score</b></i>	<i><b>5.5</b></i>	<i><b>14</b></i>	<i><b>6.5</b></i>	<i><b>20</b></i>	<i><b>14</b></i>

From Fig 7.1, below, we can see that the pattern is broadly consistent across Phases but with Demonstration indicating a lower position in Phase 2, compensated by improvements in Trickle Down and NGO.

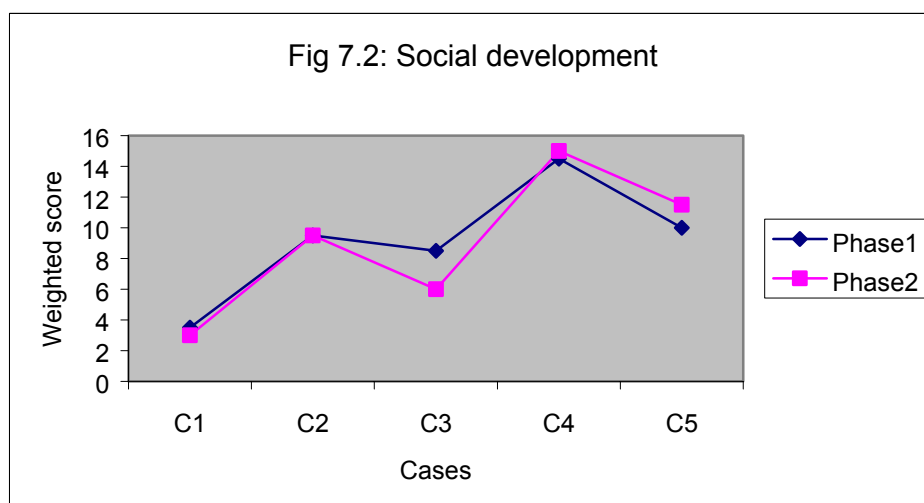




**Table 7.2: Social development Summary**

<i>Parameters</i>	<i>CASE 1</i>	<i>CASE 2</i>	<i>CASE 3</i>	<i>CASE 4</i>	<i>CASE 5</i>
Social Structures	1	3	2	5	4
Development interventions	1	3.5	2	5	3.5
Social Capital	1	3	2	5	4
<b>Total Weighted Score</b>	<b>3</b>	<b>9.5</b>	<b>6</b>	<b>15</b>	<b>11.5</b>

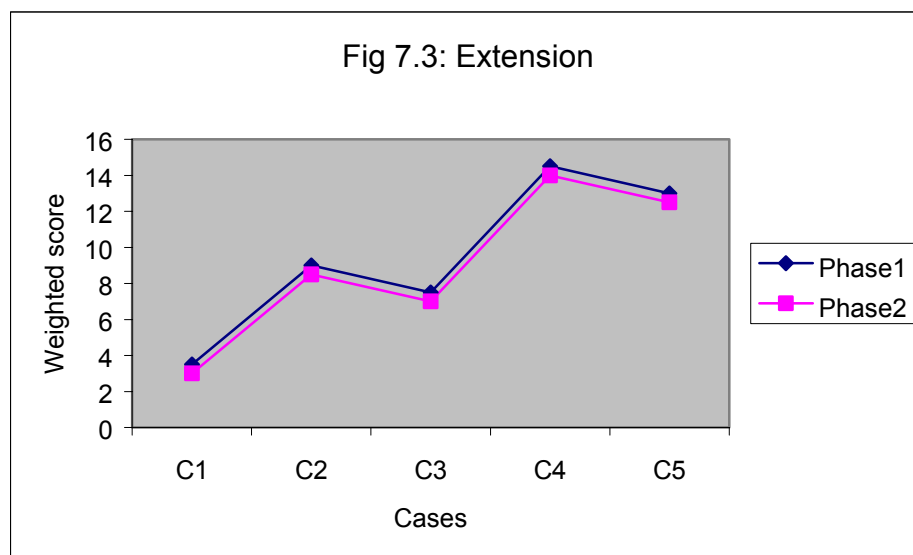
From Fig 7.2, below, it can be seen that there is also a broadly consistent pattern in both Phases with Demonstration again showing a relative decline with NGO & Model Village compensating.



**Table 7.3: Extension summary**

<i>Parameters</i>	<i>CASE 1</i>	<i>CASE 2</i>	<i>CASE 3</i>	<i>CASE 4</i>	<i>CASE 5</i>
Targeting	1	2.5	2.5	5	4
Aims and objectives	1	2.5	2.5	4	5
Methods of Training	1	3.5	2	5	3.5
<b>Weighted Totals</b>	<b>3</b>	<b>8.5</b>	<b>7</b>	<b>14</b>	<b>12.5</b>

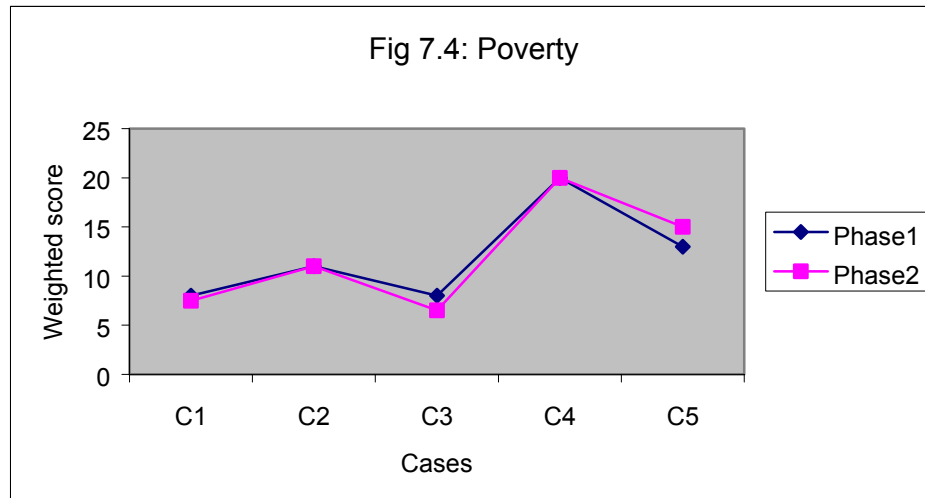
From Fig 7.3, below, as expected, it is seen that there were no differences in extension approach between Phases (since the cases represented well the approaches that they represent).



**Table 7.4: Poverty Impacts Summary**

<i>Parameters</i>	<i>CASE 1</i>	<i>CASE 2</i>	<i>CASE 3</i>	<i>CASE 4</i>	<i>CASE 5</i>
Food levels	1.5	3.5	1.5	5	3.5
Latrine	2	3	1	5	4
Health and medical preferences	1.5	3.5	1.5	5	3.5
Participation on Aquaculture	2.5	1	2.5	5	4
<b>Total Weighted Score</b>	<b>7.5</b>	<b>11</b>	<b>6.5</b>	<b>20</b>	<b>15</b>

Fig 7.4 again indicates a similar and consistent pattern between Phases, with an even slighter decline in Demonstration compensated by NGO.



### **Aquaculture and poverty**

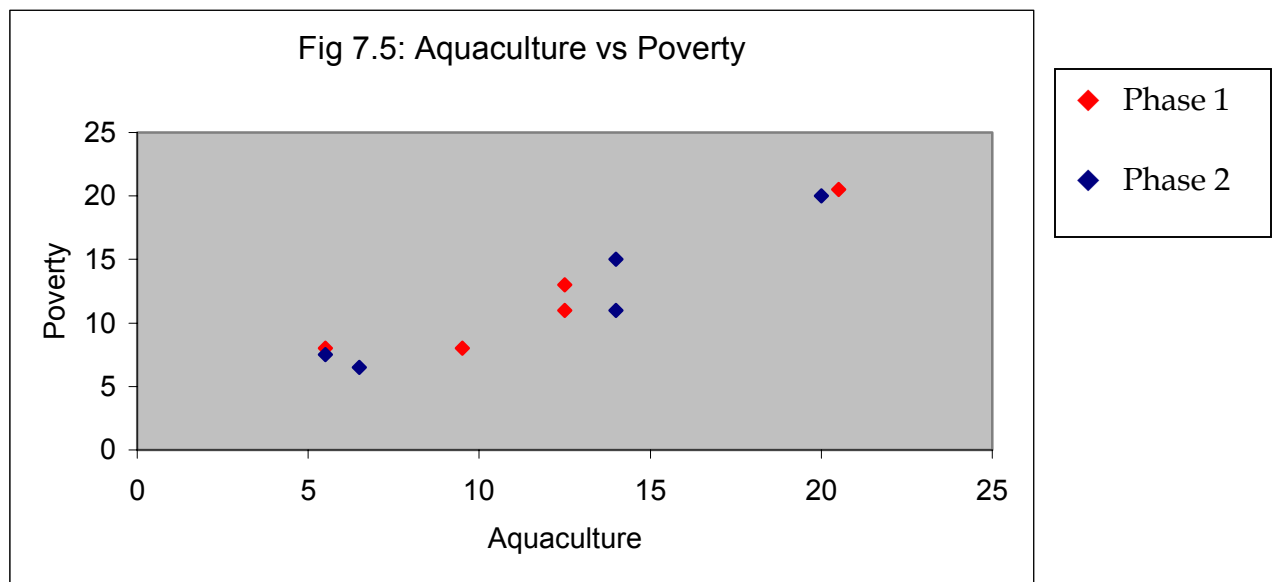
Wright (1997, p.88) opined that ‘ *when exploring the relationship between two variables the most useful approach is graphing the data*’. He further suggested the use of scattergrams or scatterplots.

Phase 1 results indicated that there is a positive relationship between aquaculture and poverty. From Chapter 6 section 6.3 it becomes clear that the key relationships are:

- Aquaculture increases food consumption and income
- Extension intervention can influence input use and stocking rates of fish
- Level of education influences management and eventually fish production

If we examine the data from both Phases (see fig. 7.5) we see that aquaculture and poverty are very much linked. And this linkage operates through increased fish consumption. It is important to note that the overall aquaculture summary reflects a similar rank ordering but the patterns are slightly different. There were no changes in fish production and consumption patterns in Model Village and Control where the former remained at the top and the latter positioned at the bottom in both Phases. There have been some changes in fish production and fish consumption between Trickle Down, Demonstration & NGO. In

Phase 1 the order for fish production was Model Village, NGO, Trickle Down, Demonstration & Control but in Phase 2 it emerged as Model Village, Trickle Down, NGO, Demonstration and Control. This might be due to the fact that there are more perennial ponds in the Trickle Down community in Phase 2 compared to that in Phase 1. Similarly, the fish consumption order in Phase 1 was Model Village, Demonstration, Trickle Down & NGO but in Phase 2 it appeared as Model Village, Trickle Down, NGO & Demonstration. Again it reinforces the suggestion that the increased fish production in Trickle Down has eventually led to increased fish consumption and thereby changed the case ordering between phases.



Again Phase 2 data clearly indicated support for the idea that money earned from fish culture is invested in food and medical care in particular (Trickle Down on agriculture; education and medical care, Demonstration on food purchases and crop production, Model Village on food, clothing, medical care and crop production and NGO on buying food and repaying loans), which reinforces the aquaculture route to impact upon poverty.

Chowdhury (1999) reported that 36% and 21% of the Model villages' farmers invested their money foods earned from fish culture in 1997 and 1998 respectively. Also 46% and 33% invested on medical care from the same sources in 1997 and 1998 respectively.

The study also indicated fish sales in Phase 1 in the order Model Village, NGO, Demonstration & Control and, in Phase 2, the order was changed by Trickle Down and the order was now Model Village, NGO, Trickle Down, Demonstration & Control, again emphasizing fish sales increase as aquaculture production increases.

#### **Findings and theories available in this area:**

It is clear that Aquaculture can contribute to household food security and household income (Muir, 1999; Edwards, 1999; Langworthy *et al.*, 2001; Edwards, 1999). In mentioning the role of aquaculture in poverty reduction Edwards (1999 p.27) cited that *'its potential role as an entry point to contribute to poverty alleviation should not be overlooked'*. The introduction of aquaculture in the rural communities can increase production and eventually on-farm fish consumption (Ahmed *et al.*, 1993).

In a livelihoods review on NFEP project, Frankenburger *et al.*, (2000, p.14) cited that *'fish that is produced is both consumed at home and sold, but more than 65 percent of households that engage in fish culture mainly consume fish'*. In another recent livelihoods review of a fisheries development project in Bangladesh, Langworthy *et al.*, (2001, p.34) cited that *'there are several benefits of fish production and cited that 'first, the increased fish production provided an important additional sources of food that could be consumed directly. Second, the increased fish production provided opportunities for additional cash income to meet household's needs. Finally, increased fish production provides social benefits'*.

While reviewing aquaculture in the North west of Bangladesh, Gregory and Kamp (1999, p.37) opined that '*aquaculture now contributes significantly towards the financial and nutritional needs of many farming households*'. Sen *et al.*, (1997) also suggested that small-scale aquaculture can contribute to both improved food security and transitory food security.

It is important to note that income derived from fish culture can be used in lean seasons when households are in crisis (Langworthy *et al.*, 2001). It is documented that aquaculture can also improve women's position in the society .By training women in aquaculture their social status can be improved (Nath, 2000; Langworthy *et al.*, 2001).

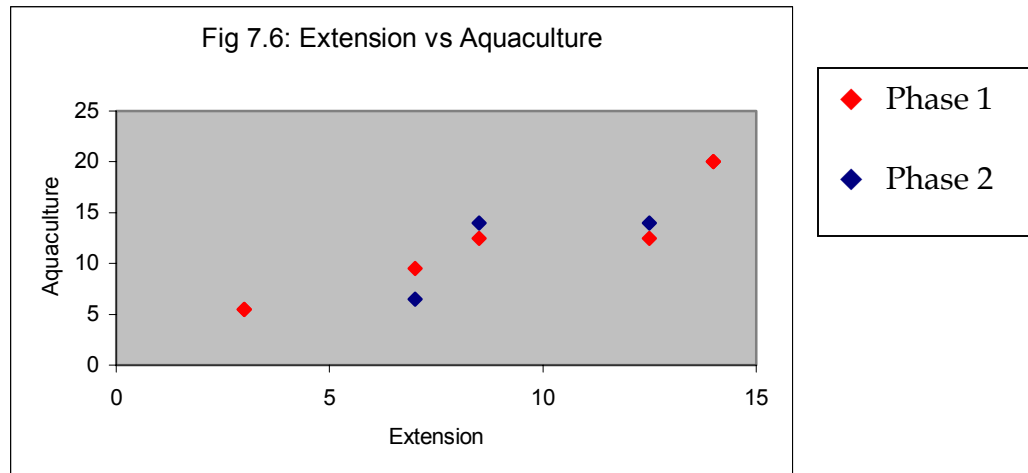
### **Extension Versus Aquaculture**

The study affirmed the positive links between aquaculture improvement and extension intervention.

From Chapter 6 section 6.3 it becomes clear that the key relationships are:

- Extension can influence upon input use, selection of species and eventually on fish production

If we examine the data from Phase 1 the ordering of input usage pattern was Model Village, NGO, Trickle Down, Demonstration & Control. A similar pattern exists from Phase 2, which again reinforces the linkage between extension and aquaculture. Again the selection of species was better in both Phases in Model Village, Trickle Down and NGO respectively indicating that extension is probably impacting upon the levels of knowledge. It is important to mention that the increased use of inputs in particular in both phases for wealth Groups III and IV clearly indicates the impact of extension upon the poor, in particular.



### Findings and theories available in this area:

This study suggests that a community and group approach to small-scale aquaculture intervention has had higher and direct impact on community food security and on income (Muir, 1999; Bhuiyan, 1999; Chowdhury *et al.*, 2000). More particularly, the absence of any external interventions seems to leave the community with an impoverished aquaculture – thus technology does not spread effectively through a process of diffusion.

Chowdhury (1999, p. 8) opined that *'it is clear that the MFVP community based approach made a significant improvement on pond culture techniques in the villages. There is a sustained increase in fish production, management practice and attitude. It can be predicted from assessment that from this approach this programme benefits a greater number of poor and marginal farmers. The study shows that the increased fish production is having an impact on family nutrition and economy. This is a positive indication of the continued use of the MFVP extension methodology for poor and marginal farmers specially. Through aquaculture development and optimum use of water resources the rural livelihoods may change positively with long-term sustainability.'*

NFEP Annual report (1998, p.8) stated that *'the MVP has sustainable impact on fish production, income and nutritional levels of farmers'*

In the case of RDRS (Case 5), earlier Study findings contained in RDRS Evaluation Report (1999, p.11 ) also cited the following comments:

*'It is expected that fish production would increase more as the adoption rate of fish culture technology will increase. The inputs of fish culture are locally available and easily manageable. Many neighbouring farmers found interested and started fish culture in their own ponds'*

and

*'Aquaculture proved as income and employment generation activity and ensuring household food and nutrition security'*

In this respect, Frankenburger *et al.*, (2000, p.14) cited that *'in areas where there has been extensive fisheries development programmes, the frequency of use of lime, inorganic fertiliser and supplemental feed goes up. This indicates that extension messages are having an impact.'* In a recent fisheries project review, in Bangladesh, Langworthy *et al.*, (2001, p. 34) cited that *'the project is providing pond owners, especially smaller pond owners, with effective ways to utilise their available resources more intensively.'*

Access to information is a key constraint for poor farmers aquaculture efficiency. Increased knowledge of poor farmers can increase fish production on a sustainable basis. Increased confidence eventually can assist shift from subsistence farming to semi-intensive/ intensive farming. (Collier, 1998; Edwards, 1999).



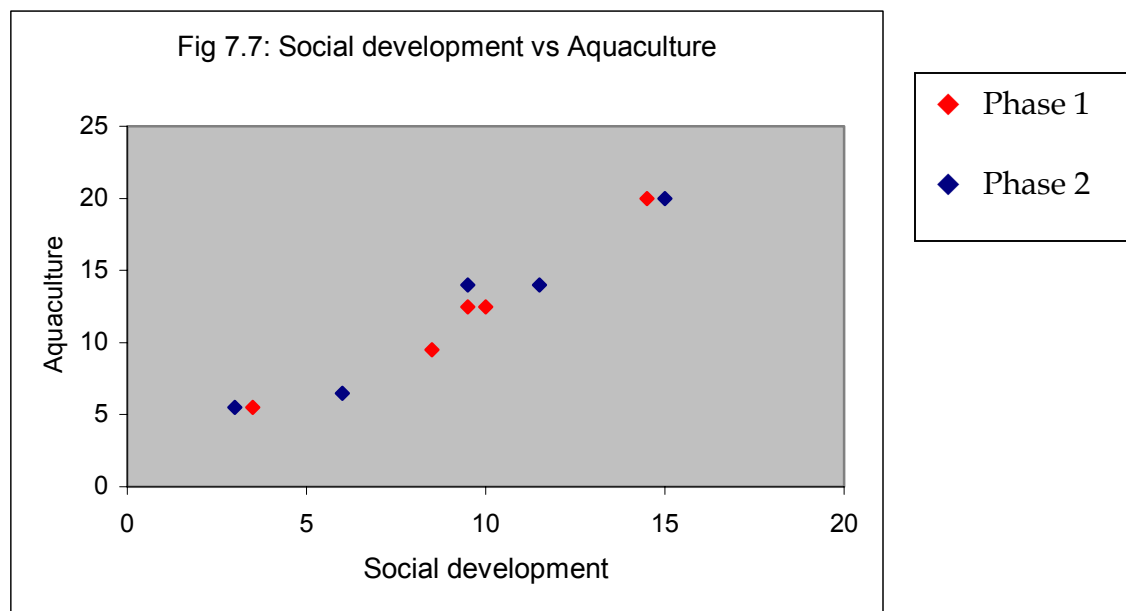
Methods of training and provision of training are very important for transformation of information. The study also reiterated that linkages are important for securing livelihoods options. Working with them not working for them proved justified and people not resources are important for sustainable development as is the case in particular, in Case 4 which put forward a basket of choices for the farming community. And thus Pretty (1995, p. 1249) rightly stated that ‘ *technologies are not sustainable: what needs to be sustainable is the process of innovation itself*’. Flexibility in extension approach can bring about greater success in terms of its acceptability on behalf of the extension officers.

### Social development Versus Aquaculture

The study indicated that there is a positive relationship between aquaculture improvement and social development in the communities.

From Chapter 6 section 6.3 it becomes clear that the key causal links are:

- Networking with Fry traders can influences upon aquaculture improvement
- Giving away fish can enhance social capital



It can be claimed that social capital can to some extent impact upon aquaculture production, for example by exchanging and or sharing information and by promoting collective action such as, fingerling production, input purchase and netting ponds. Conversely, aquaculture can itself influence the enhancement of social capital by the exchange of fish as gifts among members of the community.

From both Phases, it is seen that, forming groups and promoting fisher communities' interactions can enhance the sharing of information and eventually improved management practices. The study indicated that fry traders are the main sources of fingerling in the communities and they also act as important sources of information.

In Phase 1, Trickle Down, Model Village & NGO in particular, indicated fish being given away and social capital is also reported being higher in these communities compared to others. In Phase 2 only Trickle Down, Model Village & NGO reported instances of fish being given away.

Thus it emphasises the linkages between social development and aquaculture once again.

#### **Findings and theories available in this area:**

Langworthy *et al.*, (2001, p. 34) in a recent review of fisheries project in Bangladesh also indicated that aquaculture can enhance social capital by exchanging fish among neighbours and by entertaining visitors and cited that *'households reported that with the fish available they were able to provide food for visitors to their home. Being able to accommodate visitors is an important way that households are able to build up social capital'*.

While concluding the success of the aquaculture extension in the Northwest of Bangladesh, Gregory & Kamp (1999, p.21) cited that *'success also heavily dependent on the close relationship between the project and other development organisations in the area'*. This is simply indicating importance of the relationship between aquaculture extension and the enhancement of social capital.

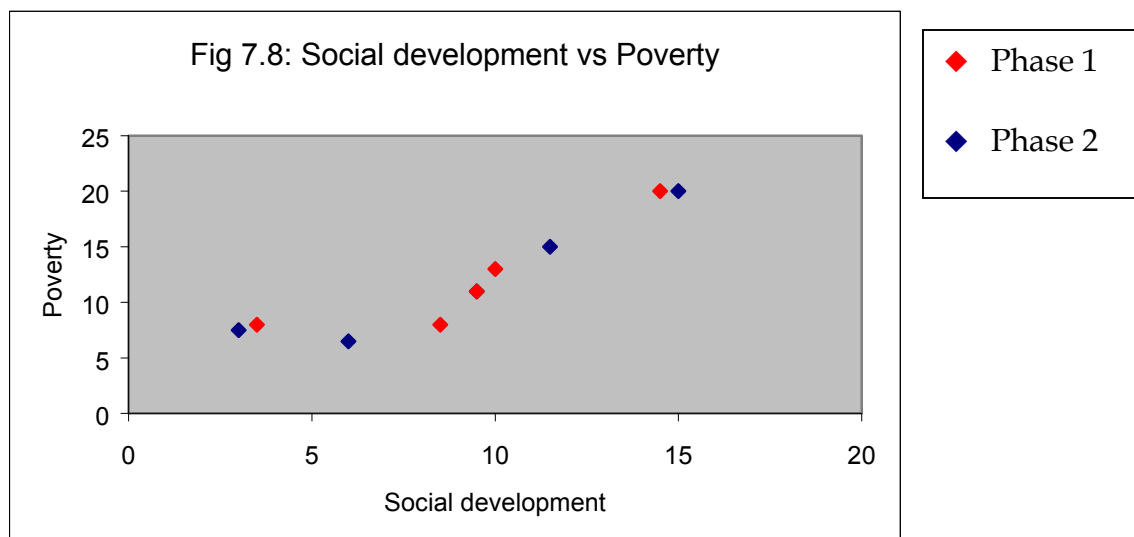
Within the limited constraints and wide spread dissemination of technology Thompson *et al.*, (2000) suggested that to work through group approach and through forming of clubs of farmers and social capital has the ability to enhance flow of information.

### Social development Versus Poverty

The study indicated that there are positive relationships between social development and poverty.

From Chapter 6 section 6.3 it becomes clear that the key relationships are:

- closeness to medical centre can have health implications
- closeness to population centres increases off-farm opportunities
- increased social capital can help people in a crisis.



If we examine the data in Phase 1, Control & Demonstration members from Groups IV and III, in particular, reported visiting medical centres. Again Control members, in particular, in Phase 2, reported visiting medical centres mainly because of closeness.

Increased social capital can influence vulnerability of people. If we look at the data in Phase 1, Trickle Down, Model Village & NGO indicated collective action by helping the distressed and widows in crises. For example Trickle Down, food or cash in a crisis, Model Village reported sponsoring the marriage of orphans and arranging medical treatment for the distressed, supported Group IV members. In Phase 2, Trickle Down, Model Village & NGO again indicated the prevalence of collective action in the community and supporting poor people during crises.

Thus we can see that the above causal links clearly affirm the working explanation and thereby the positive routes between social development and poverty.

**Findings and theories available in this area:**

In a recent NFEP livelihoods review (DFID 2000, p.v) cited that *‘village level informal linkages are probably the strongest with extremely poor people relying, in times of stress and vulnerability on friends and neighbours whilst the relatively better off are more like to depend on patronage from the rich’*. It further added that *‘ a large number of informal linkages are used on a daily basis to support livelihoods in the form of purchasing and selling limited garden produce, religious support, part time employment and assisting in health problems that really support families’*.

Krishna & Uphoff (1999, p.21) mentioned that *‘villages that show higher levels of collective action in one sphere of development activity also exhibit higher levels of*

*collective action in other spheres'. Dhesi (2000, p.203) opined that ' a community's ability to cope with stress, engendered by the development processes, depends upon its material well-being and its stocks of social capital'.*

*Bebbington et al., (2000, p.16) stated that 'building social capital is a central element of empowerment-and empowerment is in turn central to poverty reduction, both as a means and an end' and (p. 15) that 'poor peoples organisations can help expand peoples asset bases by mobilising and acquiring land, forest, water and other forms of natural capital directly. Similarly, such organisations have played a critical roles in gaining access to financial, technical, and other resources, either by seeking them out directly or through representation or advocacy'.*

*Thus Sen (1990, p.230) also reiterated that 'a small group structure is needed for giving the poorer sector a group personality, initiative and also bargaining power in the development process, as often it is found that the priorities of disadvantaged small people differ from the community as a whole or the country by large'.*

*Edwards (1996, p.8) cited that 'linkages are important for many different reasons: learning, influencing, resource mobilisation and communication. Strong linkages which are properly used are one of the key to both scaling up and sustainability' and (p.61 ) that 'build as many as strong linkages as possible both vertically and horizontally'. Linkages are important for many different reasons: learning, influencing, resource mobilisation and communication. Strong linkages which are properly used are one of the keys to both scaling up and sustainability'.*

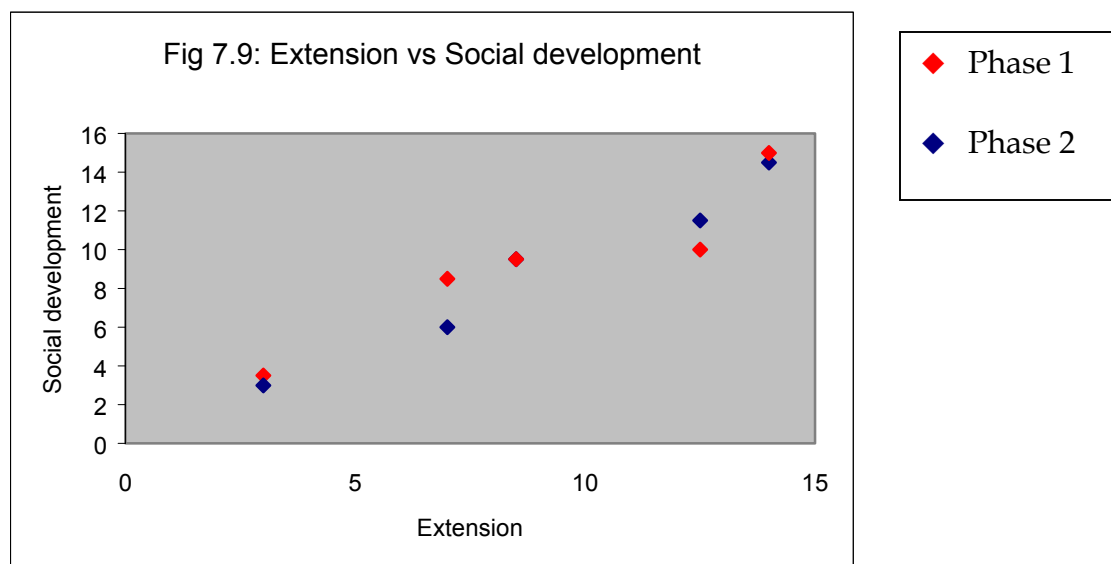
Bebbington (2000, p.14, 11) ‘*the quality of peoples relationships influence their sense of well-being. And social relationships and networks are resources that help people to pursue livelihoods and solve development problems*’. He further added that ‘*when social relationships breakdown poverty increases*’. Morris (1998, p.7) pointed out that ‘*in the context of poverty, social capital can be seen as either a means to an end or as an end in itself, depending on the definitions of poverty*’. Edwards (1996) commented that context is crucial in determining outcomes of development interventions.

### Extension Versus Social development

The study indicated that there is a positive relationship between extension and poverty.

From Chapter 6 section 6.3 it becomes clear that the key relationships are:

- increased awareness by extension has increased awareness of livelihood options
- formation of groups and fish farmers’ communities increases liaison for other livelihood options
- networking helps information sharing



Phase 1 data suggests that increased awareness through extension has increased wider awareness in Trickle Down, Model Village & NGO where members in Model Village established personal relationships and visited the Upazilla centre, NGO members were linked to IFADEP and established a hapa breeding programme with the local Upazilla Fisheries Officer. If we examine data from Phase 2 we find that similar evidence can be seen in Trickle Down, Model Village & NGO where members are more involved with more development agencies and thereby access information and credits for their livelihoods. There is evidence that an individual in Model Village has established nurseries with the help of local fry traders as well and having progressed from subsistence to commercial farming. Thus the above causal links are demonstrated, which clearly reinforces the explanation.

**Findings and theories available in this area:**

Chowdhury et.al., (2000, p. 6) stated that *‘the close involvement of a non-governmental agencies like community council, informal groups, cooperatives, rural workers organisations and women’s associations etc. has the potential to reach community and individuals more easily and motivate them to adopt development activities.’* Dhesi (2000, p.201) opined that *‘development initiatives should take into account the role of social capital, that is, shared knowledge, understandings, values, norms, traits, and social networks to ensure the intended results.’*

And Hayward (1987, p.5) rightly mentioned that *‘rural development projects aiming at strengthening community should aim at strengthening the social solidarity, unity and cooperation between people’.*

Drinkwater & Rusinow (1999, p.9) opined that ‘*social and human capital are now seen as the most important resources to take into account in projects with a strong livelihoods approach, and yet both are rather amorphous – they do not lend themselves to simple definitions or quantitative measurements*’.

Bebbington *et al.*, (2000, p.110) mentioned that ‘*social relationships and networks help poor people work together, share risks and resources, act collectively and build linkages with external agencies*’. While mentioning about dissemination of fish culture information, Sen *et al.*, (1997, p.110) cited that ‘*the development of local networks to disseminate information should thus be encouraged*’.

### **Extension Versus Poverty**

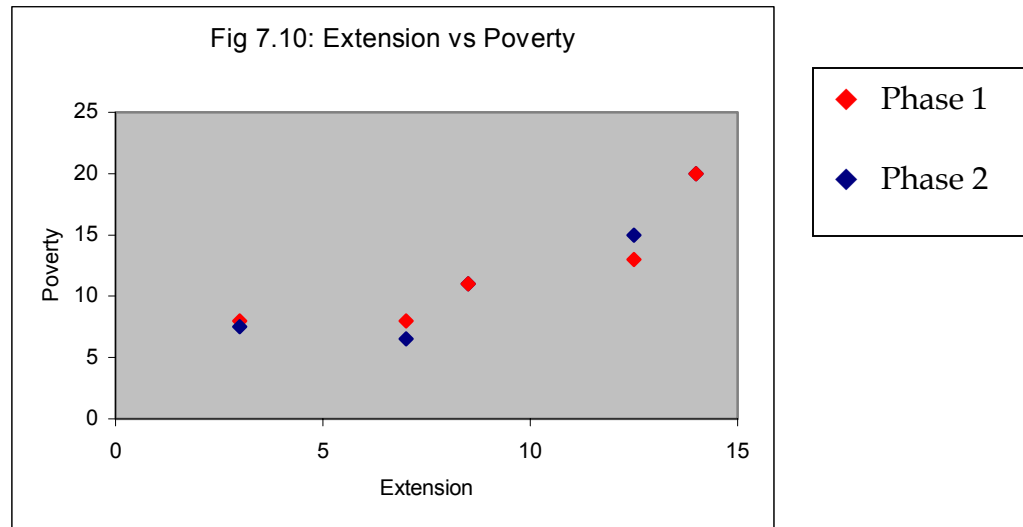
The study pointed out that there is a positive relationship between extension and poverty.

From Chapter 6 section 6.3 it becomes clear that the key relationships are

- extension can build human capital by providing information, knowledge and skills on fish culture, crops and eventually on food levels, health and income generation
- increased participation of women in aquaculture may possibly increase their involvement in decision making

If we examine the data from Phase 1 we can see that in Model Village and NGO pond management in particular has improved amongst Groups IV & III members, eventually leading to higher production and income. This has led to higher consumption of fish and improved food levels and thereby has positively affected health as reflected in Trickle Down, Model Village & NGO in particular.





A similar pattern has also emerged in Phase 2. In addition, it is also viewed that women's participation in aquaculture in Model Village and NGO in both Phases might possibly have increased their decision making role. Thus the causal links clearly uphold the explanation.

#### **Findings and theories available in this area:**

A number of authors have commented on this interaction. For example, Cox *et al.*, (1998, p.16) cited that '*the levels of skills and knowledge of a household is both a component and determinant of poverty and poverty status*'.

Christiplos *et al.*, (2000, p 36,10) cited that '*access to information is the primary obstacle to poor people's ability to choose their livelihoods*'. They further added that 'the core of extension is to help people make better choices through supply of information and enhancement of peoples capacities to process information and act on it'.

Edwards (1999, p.26) opined that '*perhaps the single largest constraint for aquaculture to contribute to the improved welfare of poor households is their limited knowledge of the*

*range of technological options that has potential to comprise part or all of their livelihoods. He further added that ‘people’s attitudes and ethics, knowledge and practical skills are major factors that influence rural aquaculture through various means such as education, research and development’*

Sen (1999 p.10) cited that *‘the effect of human capital for increasing long-term economic growth is well known. In that capacity, development of human capital has strong income-poverty reducing effects’*. Further, Sen *et al.*, (1997, p.115) suggested that *‘small scale aquaculture can contribute poverty alleviation provided that extension approaches and methods are appropriate and flexible’*.

RDRS evaluation report (1999, p. 23) cited that *‘due to increased income and technological knowledge confidence of women has also increased’*.

### **In Summary**

If we look back to our model, Chapter 2, section 2.8 we can clearly see links are established from the findings. It re-establishes the following links:

- There is a positive relationship between aquaculture and poverty, and this operates through improved consumption, and sales of fish, the income from which can be invested or used to purchase other foods or for medical care.
- There is a positive link between extension intervention and aquaculture improvement, through better targeting leading to better use of inputs and improved stocking rates.
- There is a positive relationship between aquaculture improvement and social development in the community, operating in both directions, where fish can be

- used to improve social capital, and social capital can improve the exchange of information, informed decision making and confidence to lobby external agencies.
- There is a positive relationship between social development and poverty, both through the route of improved aquaculture, but also through greater participation, greater access to other improvements such as latrines and health care.
  - There is a positive relationship between extension and social development through the establishment of groups, fisher community actions and the generation of self-confidence in dealing with officials.
  - There is a positive relationship between extension and poverty through the aquaculture and social capital routes outlined above.

The study finally suggests that all these aspects go very much hand in hand. This was also suggested by Streeten (1994) who, in his development discussions on building human capital, phrased it as “*all goes together*”. This means that high aquaculture; high extension and high social capital eventually lead to a higher positive impact upon poverty. Indeed, it is not that the Model Village approach to extension (Case 4) is such a vast improvement on the other methods studied, but rather that it is the total impoverishment of the marginal communities in the Control case that the lack of external intervention, social capital and technological improvement produces that is so dramatic. Indeed it may be argued that the difficulty experienced in finding communities with no external interventions is itself an indication that those found were not only impoverished in Social Development, but were actually socially dysfunctional by normal Bangladeshi standards.

Of all the components studied there is no evidence that one or other has to be promoted in order to achieve significant impact upon the level of poverty, but that it is the interaction between them that is vital. Thus the study upholds the working explanation that

***‘aquaculture extension approaches that fail to substantially address social development will lead to no more than a superficial reduction of poverty’.***

Published findings and comments that also support the views expressed to those findings generated from the study are cited in the Box below:

- Adams (1982, p.1) *‘extension is part of the effort to achieve a balanced social and economic development’.*
- To comment on development intervention strategy, Shepherd (1998, p. 147) cited that *‘what is required therefore, is a holistic approach to rural development, focused around livelihoods, social development and environment of the poor’.*
- Streeten (1994, p.233) also expressed similar views relating to development and said *“all good things goes together”*
- Muir (1999, p.6) made preliminary observation on aquaculture impacts on poverty and cited that *‘aquaculture targeting for poverty impact may be more effective with in an established local development structure’.*
- Edwards (1996 p. 60) while looking at NGO performances (factors underlying impact, sustainability and cost effectiveness) in Bangladesh and India concluded that *‘get the balance right between material and social/organisational development, and keep it there over time’.*
- Frankenburger *et al.*, (2000 p. V. ) stated that *‘to pursue opportunities that will be more inclusive in enhancing the livelihoods of the poor, a more comprehensive programming approach will be required for the northwest region in the future. This approach will need to linkup safety nets, service provision and production credits for the vulnerable households create networks of institutions that collaborate in strategic planning for location specific areas’.*
- In NFEP social audits Eggen (1999) suggested to make balance of social, institutional and production needs understanding the context and incorporation of extension delivery system.
- Plurality of extension is needed (Edwards, 1999; IFAD 1998; Christoplos *et al.*, 2000).

- Christoplos *et al.*, (2000, p. 54) cited that '*if new strategies are to be formed, the social and economic implications of different trajectories must be brought together. Economic interest and public interest in service provision should be integrated, but not to be assumed to be interchangeable.*'
- Gupta *et al.*, (1999, p. 21) suggested that '*in addition to technological innovation, an institutional approach is vital if resource poor farmers are to benefit from technological advancement.*'

In addition to the study findings outlined above, it is necessary to draw attention to some important peripheral issues. In conducting the study a number of other issues have been raised that need to be dealt with here.

## **7.2 Defining Poverty and identifying indicators.**

In the past, the income dimension, such as per capita income, was used to define and measure poverty (Maxwell, 1999). The definition of poverty based upon income has been criticised for its' narrowness of meaning (Chambers 1985; Wickramasinghe 1996; Sen 1997). A focus on the increase of income or production in the recent past failed to address other aspects of human well-being (Ullrich, 1992). The increase in income may be a route but not a solution to the vicious nature of poverty. From the mid 1980s the multidimensionality of poverty has been recognised fully, which essentially covers both income and non-economic dimension of poverty (Chambers, 1985; Sen 1997; Maxwell 1999). But indeed the multidimensionality of poverty has made it complex in both definition and measurement, since poverty is very often contextual and dynamic (Nabi *et al.*, 1999). It is also suggested by other studies that poverty processes and livelihoods options are location specific (Frankenburger *et al.*, 2000). It is perpetuated by structures, processes and norms within which it exists (Frankenburger *et al.*, 2000; Mannan *et al.*, 2000). Therefore, the complexity of poverty is very variable and dynamic.

It is interesting to note that the community members in this study considered poverty mainly on material dimensions. They did not prioritise the social dimension of poverty.

Qualitative measures have been largely omitted although some of them might have significant influence upon livelihoods' improvements and securing better livelihood options. Villagers consider traditional criteria and respond automatically from a mental checklist for poverty criteria.

If we reflect back to the study villages, even within similar agro-ecological regions, communities are not homogenous. They differ in terms of context and social profile and therefore, the manifestation of poverty can be quite different. They also vary in resource endowment; natural resources availability; economic; political and institutional features; problems and priorities and preferences. Thus each indicator has different and complementary uses (Maxwell, 1999). FAO (2000, p.7) cited that '*different socio-economic categories within a community can have widely different livelihoods strategies*'.

From the study it is revealed that, since poverty is location specific, the identification and measurements of indicators should be analysed and defined locally both for measuring the impacts upon livelihoods and also for policy implications. The best information comes from the poor and must be owned by the poor themselves for ownership of the programme and mobilising for planned action.

As poverty is considered to be multidimensional the weights given to different parameters are critical. The weighting can influence the overall poverty measures and impacts (Maxwell, 1999).

Bhalla *et al.*, (1997) called for an analytical framework based upon indicators in the economic, social and political dimensions, which are endorsed in this study's 4 aspects. The indicators set out in this study at the outset were not found equally important.

However, the study suggests the following indicators as useful in measuring livelihoods impacts where aquaculture as an entry point:

**Table 7.5: Potential Indicators in the four aspects under study**

<b>AQUACULTURE</b> <ul style="list-style-type: none"> <li>▪ Pond size and seasonality</li> <li>▪ Fingerling stocking</li> <li>▪ Use of inputs</li> <li>▪ Fish production</li> <li>▪ Fish consumption from ponds</li> <li>▪ Fish sale</li> </ul>	<b>SOCIAL DEVELOPMENT</b> <ul style="list-style-type: none"> <li>▪ Social structures</li> <li>▪ Social capital</li> <li>▪ Closeness to local social services</li> <li>▪ Number of external interventions</li> </ul>
<b>EXTENSION</b> <ul style="list-style-type: none"> <li>▪ Aims and objectives</li> <li>▪ Targeting</li> <li>▪ Training methodology</li> <li>▪ Use of extension methods</li> <li>▪ Use of extension materials</li> </ul>	<b>POVERTY</b> <ul style="list-style-type: none"> <li>▪ Food levels</li> <li>▪ Latrine improvements</li> <li>▪ Health and medical preferences</li> <li>▪ Access to credits</li> <li>▪ Participation in economic activities and decision making</li> </ul>

In addition, the model from which the research questions were generated (Fig: 2.4) represents a framework of interaction that goes beyond development, *per se*, and looks into the means of change. Therefore, Poverty has to be articulated by the poor for effective planning and achievements (Maxwell, 1999). In which regard it is important that livelihood indicators have to be derived from each community for measuring impacts.

### **7.3 Research Methods for sustainable development**

Importantly, this is the first study of this kind in an aquaculture context. DFID Bangladesh has been putting emphasis on the need to undertake more broadly based investigations to assess the impacts of aquaculture intervention on livelihoods.

The study also stresses that livelihoods assessment should consider a range of participatory data collection methods and techniques for a fuller analysis of poverty impacts in both

economic and non-economic terms. Analysis of relationships between community people, socio-economic, political and environmental, which interact with each other, sometimes directly and often co-incidentally make the whole study process extremely complex. However, groups of methods targeting different indicators can make useful and clear understandings of the poverty situation. A large amount of information is needed for systematic analysis (Shepherd, 1998). Social analysis is the key to inform factors influencing people's livelihoods (Shepherd, 1998). It is also mirrored in the study that poverty is indeed both caused and affected by a range of factors, not only in the economic dimension (Nabi *et al.*, 1999).

Furthermore a livelihood approach principally involves a wide variety of factors, which determines the overall poverty reduction impacts, and the extent of livelihood improvements. Therefore, a wide variety of information needed to be collected by means of a large number of methods. Moreover, identification of both qualitative and quantitative indicators is fundamental (Hussein, 2000; Westley & Rashid, 2001). It offers most opportunities for triangulation of data gathered.

Supporting this view, Cox *et. al.*, (1998, p. 21) cited that '*survey based analysis concentrating on income or consumption shed little light on non economic and non-financial capital assets, such as education, health, nutrition and social standing*'. Christoplos *et al.*, (2000, p.11) opined that '*an understanding of the broad and shifting patterns of rural livelihoods and the power relations influencing them, is therefore, a prerequisite to the introduction to pro poor technical change, as is the capacity to monitor impacts and make necessary course corrections*'.



Drinkwater & Rusinow (1999 p.7) cited that '*a multi-dimensional view of livelihoods which allows for the identification of the most vulnerable households and the placing of peoples priorities and aspirations firmly at the centre of the analysis and planning process*'.

To measure project effects and impacts, quantitative surveys have been emphasised along with qualitative assessment (Langworthy *et al.*, 2000). For measuring poverty and ensuring quality a number of tools need to be used (Cox *et al.*, 1998).

The selection of multiple cases was also advantageous in revealing impacts caused by various parameters and the extent of their influence on aquaculture; social development and poverty. PRA helps illuminate the subliminal appreciation of the impacts of various elements, which interacts with things physically, allows us to observe and to respond with further enquiry.

#### **7.4 Reflections on the methods**

A number of key impressions emerged from the research process, as follows:

- Community meetings at the beginning with local officials working in the community were very useful. These not only help establishing rapport but more importantly created confidence in the research team which eventually assist in quality data collection.
- The value of PRA in working at community levels and analysis by the community members is immense. In addition, it has increased self-awareness of all in particular worse off and women; strengthen solidarity and increased self-confidence of all in particular, worse offs and women. PRA can substantially help to empower community members and improve interactions with outsiders.

- Balanced by observation on technical issues done by an expert. This was useful since it helps triangulating data collected by focus groups discussion. But frequent observation throughout the period of aquaculture season might be more compelling.
- Flexibility in methods is important. For example Group I&II members felt comfortable to work on papers and Group IV members enjoyed working at a ground with locally available materials and reflections on how the session went on and the outcomes of the session. The use of Matrix scoring tools was very useful and entertaining.
- For research use PRA should be carefully used only as appropriate, but for launching development activity it can be used widely and extensively. People get annoyed with frequent visits and can have serious implications on the findings.
- For collecting quality data contributions or ability of both the investigator and the community members is essential.
- Combination of methods is efficient in data collection, the PRA providing contextual, qualitative data and the conventional surveys providing quantitative data. But it is important to reflect upon the data collected from all methods and cross match to look at relationships during the process of data collection to get a clear understating of the issues to be investigated. Quantitative information along with qualitative sources was rewarding as one illuminates the other.
- Understanding of the locality and local context helps to reject information on face value and assist to probe during discussion.
- The research as a means of extension was not fully utilised. People in the communities asked many questions about aquaculture and other related issues but it was not possible to respond immediately since the research involved data collection

about their current levels of knowledge and overall awareness of other livelihoods options.

- Failure of observational data on human interactions. The opportunity to observe human interaction between and among various groups of members was missed out.

### **Limitations**

- Increase expectation of community members
- Local peoples ability to analyse information.
- More and frequent visits can be time expensive for poor people.
- Skills of using tools and techniques of data collector
- Using a ranking method of analysis has the tendency to expand small differences and reduce large ones, thus possibly distorting relationships

### **7.5 Research, looking forward**

This study enlightens the inter-relationships between aquaculture; social development; extension intervention and poverty. It also reviews the causal links of the above aspects. It might be interesting to investigate similar issues in a different context for example in another sector to see if similar patterns and relationships occur. If the study generates similar findings in another context, then the findings will be generalizable in any situation.

Thus it would be helpful to:

- Relate findings in another sector to see if the established relationships and linkages are similar
- Dissemination of findings through workshops at regional level
- Developing refined measures of social capital
- Detailed study of the role/impacts of informal social capital (networks)

- Conduct detail survey on fish availability from the intervention villages, in particular low priced fish production and supply.

## 7.6 Conclusions

From the study it is clear that poverty is local and complex. The cause and effect relationships are difficult to gauge. A fullest analysis is vital for determining indicators of poverty and determinants of poverty in a specific context.

Extension needs to be placed in a broad context, in particular, in poverty reduction strategies and the purpose of “development” itself. If development is to be considered as freedom of choice, (Sen, 1999) and promotion of the self-esteem of Maslow's hierarchy of needs, as the current study considers, then emphasis will have to be given to “people’s development” where extension should be an interlocutor in ensuring that people can interact effectively for their own development. This is to recognise Extension as an important aspect of rural communities’ PIPs (Policies, Institutions & Processes) emphasised in the Sustainable Livelihoods Approach (SLA) (Carney 1998). Increase in production discharged by Extension becomes only a single part (Christoplos, *et.al.* 2000) of development. The success of any Extension project in the past was simply measured in terms of the increase in productivity, income and or consumption, which of course, are fairly straightforward. The long term trends of such conventional measures mostly failed to gauge invisible impacts of interventions. Extension can discharge direct linear impact or simple linear or indirect impact, which involve complex measurement processes (Hussein, 2000). It is also important for extension that it perceives aquaculture as only one aspect of development rather than as the single, isolated technology (Edwards, 1999; Frankenburger, 2000).

Since poverty is multidimensional, the role of Extension needs to be broadened from its traditional “production” orientation in order to have an impact upon poor people’s livelihoods. The study suggests that the approach taken should not focus on one section of the community or another, but should seek to build social structures that cut across wealth groupings. Extension with both economic and social objectives would have greater impact (Christoplos *et al.*, 2000).

Any extension intervention that deals broadly with development issues using aquaculture as an entry point is likely to increase fish production. But surveying communities to identify those most marginalized to be selected as the target of development interventions is more important. Using participatory community research that explores the model framework, in Fig. 2.4, together with communities, to analyse strengths and weaknesses of aquaculture; social development and extension could itself become an effective extension method. The individuals who carry out such an approach need to be people focused; well motivated in working with communities with good communication skill and be able to have a grasp of the usage of participatory tool and methodologies, as well as being steeped in technical aquaculture.

This study very clearly indicated that aquaculture could provide an entry point for improving poor people's livelihoods in planning the management and exploitation of a natural resource and contributing to environmental improvement. The pre-condition is that, along with technical intervention, a comprehensive programme that addresses elements of social development, either incorporated directly through the establishment of social structures or indirectly by fostering people's collaborative behaviour and individual self esteem, must form part of a deliberate and targeted intervention. This is what the SLA means when people speak of ‘Multi-level’ interventions.

## **7.7 Recommendations**

It is important to note that this study clearly shows aquaculture is an entry point for poverty reduction, where Extension has to be considered simply as an interlocutor and the elements of Social Development are considered as the striking forces in improving community livelihoods on a sustainable basis. It is highly likely that if aquaculture is taken in isolation and efforts are only given to transfer a fixed technology by targeting primarily rich and medium farmers, extension will discharge disproportionate benefits in the communities that can fail to address poverty.

Reflecting upon the review of the current situation of Extension in Northwest Bangladesh, in particular, based upon the findings of the current study regarding the impacts of interventions on poverty reduction, the following specific recommendation are put forward:

- Targeting both males and females and giving them access to a wide range of information/ options using community based participatory livelihood assessment, particularly where communities are marginalized by physical location and other contextual factors.
- Incorporate bottom-up and interactive processes for Extension planning and technology development, escaping from top-down to flatter, networking organisations. Foster localised aquaculture development initiatives and incorporate social perspectives to bring about the move from a transfer of technology approach to a participatory learning approach for sustainable learning that gives emphasis on processes rather than product and enhance farmers' capacities for autonomous innovation.
- Recognise that the development of small-scale aquaculture requires initial public sector support with more support needed and for longer periods for poorer target

groups.

- In putting forward technical options promote a balance in stocking by ensuring availability of fry and fingerlings of both high and low value fish. The low value fish are affordable to the poor, particularly in small scale household production in rural areas where they may be the only source of fish protein
- Disseminating information about the nutritional advantage of fish, for example, as an essential source of amino acids, and as rich sources of certain vitamins, minerals and fats to vulnerable groups of people. Information on fish nutrition should be included in training modules and delivered during training sessions.
- Form groups/Fish clubs/FT groups/Nursery Club/ as strong local institutions and or learning organisations.
- A diversified approach for efficient utilisation of resources for sustainable livelihoods, such as small scale, rice fish farming, dyke cropping and localised nursery development by Farmers/Fry Traders.
- Networking and linkage with both formal and informal. Build linkages between as many organisations and groups as possible, both vertically and horizontally, which eventually will build social capital and enhance sharing of information, encourage collective action and crises management.
- Establish forums for sharing information and innovation. Documentation and wide dissemination of experiences, utilisation of good practices and benefits thereof. Farmer to farmer learning, workshops and seminar.
- Above all, investment of scarce intervention resources should be focused upon the intentional development of human and social capital, engaging all members of the community, for higher and sustainable impacts.
- Finally to recognise that policy changes are implied in all of the above in regard to the way that all agencies of intervention work. This needs to be more co-ordinated,

recognising that interventions can be spread more widely so that no communities are neglected, and that a common approach will benefit the achievement of a wide variety of objectives.



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